

## ARCHIVES OF OTOTOLOGY.

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### ON THE TOPOGRAPHY OF THE HUMAN VESTIBULE.

BY DR. H. STEINBRÜGGE, OF HEIDELBERG.

(*With plate v.*)

Translated by JAMES A. SPALDING, M.D., Portland, Me.

ON looking over some old specimens, I came across a series of sections which I once made for the purpose of examining the topography of the various structures in the vestibule. These sections had been made rather thick, in order to preserve the membranous portions, and were, therefore, hardly suitable for investigating the finer microscopical details. Nevertheless, repeated examinations brought out a few topographical relations which may be of some future practical value.

Although it is well known that the membranous sacculi of the vestibule, corresponding to the shape of the two recesses, do not quite fill the entire vestibule, or, in other words, that a space is left on the inner surface of the stapes which is only filled with perilymph, yet, as far as I know, these relations have never yet been accurately measured, at least in man. For this reason I have made drawings, in double the natural size, of several of these specimens, and herewith offer them to the profession.

Figs. 1 to 8 represent horizontal sections (running from above downward) through the right vestibule and utriculus. They only show a small portion of these two districts, since they begin on a level with the upper edge of the fenestra ovalis, just above the overlying facial canal, and terminate at the level of the lateral limb of the stapes. Within this

space the walls of the utriculus are entirely free from the orifice of any canal. In fig. 1, *f* indicates the facial nerve, which has been twice divided; *v*, the nerve of the vestibule; *e*, the connecting ligament. In figs. 6 and 7, *s* indicates a portion of the medial<sup>1</sup> limb of the stapes which has been preserved. The lateral limb (also marked *s*) is only reached in fig. 8, owing to its deeper position.

In fig. 9 we have a vertical section perpendicular to the long axis of the pyramid (right side), and intersecting the vestibule considerably toward the medial side, as is proved by the fact that the membrane of the fenestra rotunda (*m*) and the beginning of both scala are visible. The facial nerve (*f*) has been divided obliquely. *N* is the nerve which runs to the ampullæ of the sagittal and horizontal semicircular canals. *Ls* indicates the section of the lamina spiralis. The curved line running downward and to the left from the membrane of the fenestra rotunda corresponds to the section of a pseudo-ligament. Only the upper half of the utriculus could be preserved (attached as it was to the roof of the vestibule by numerous ligaments), owing to the fact that the section was rendered difficult by the presence of a stony enostosis<sup>2</sup> in the posterior wall of the vestibule. The macula, which has been divided perpendicularly, can be seen on the anterior wall of the utriculus. The medial surface of the section shows the recessus hemisphericus, with the sacculus, in the space between the anterior wall of the utriculus and the stapes, whilst the remaining portion of the utriculus fills the upper end of the recessus hemielipticus. The oblong body of the utriculus extends downward into the ampullæ of the frontal semicircular canal, while its anterior wall describes a curve, the concavity of

<sup>1</sup> On account of the oblique relation of the pyramid to the sagittal plane of the cranium, the terms "medial," "anterior," etc., might easily give rise to misconception. Hence, I beg to remark that by "medial" is meant the direction toward the summit of the pyramid; by "lateral," toward its base. "Anterior," in the vestibule, corresponds to the wall of the fenestra ovalis; "posterior," to the opposite direction. Therefore, in contradistinction to the usual terms, "anterior" and "posterior" limb of the stapes, the terms "medial" and "lateral" have been chosen.

<sup>2</sup> Moos and Steinbrügge, these ARCHIVES, vol. ix, p. 330: "On a peculiar modification of the bony structure in the pyramid of the temporal bone." Since this date, however, I have, unfortunately, found these enostoses in a majority of pyramids.

which is directed anteriorly (indicated by dotted lines, because the injured portion of the anterior wall of the utricle is pushed too far backward in the specimen lying before us).

Fig. 10 represents a vertical section through the vestibule of the left pyramid, parallel to the long axis. The utricle is removed. The upper fissure indicates the ampullar orifice of the horizontal and sagittal semicircular canals. The ampulla of the frontal semicircular canal (*a f*) is visible beneath the floor of the vestibule. It has been divided obliquely by the section from in front backward, *before* its osseous canal entered the vestibule. Still, we learn something of its position, as well as of that of the nervous branch which enters it from the side of the cochlea (the specimen belongs to the left petrous bone). *R h* indicates the recessus hemisphericus, the periosteum of which closes over the so-called sacculus, in the bottom of which we see traces of the distribution of the nerve. The nerves which enter the pole of this recessus are only seen as cross-sections at the left side of the figure, owing to the fact that the section happened to fall on the further side of the pole. Hence this figure represents only a segment from the posterior half of the recessus hemisphericus.

In fig. 11 we can see the entrance of the vestibular nerve into the vestibule, and its coarser distribution in the macula, the situation and extent of which can be passably well determined by combining the horizontal section with the vertical section (fig. 9). I will venture to call attention to the fact that even at the level of the medial limb of the stapes (*s*, fig. 6) the nerve no longer penetrates the bone, while the macula ceases even above this level. The vertical section, fig. 9, confirms this relation of the parts. Several blood-vessels are visible in fig. 11, just below the nerve. The vessel which has been divided longitudinally is an artery. The other cross-sections have not been distinctly preserved; some of them seem to be merely fissures for vessels within the osseous tissue.

A careful examination of all the sections will demonstrate, first of all, the regular ellipsoidal figure of the various sec-

tions of the vestibule, the major and minor diameters of which increase step by step from figs. 1 to 8. This regularity is somewhat interrupted by the entrance of the nerve, and in figs. 6 to 8 by the recessus hemisphericus (fig. 6, *r h*) advancing toward the side of the cochlea. Nevertheless, the latter irregularity is less noticeable in preserved specimens, since a portion of the periosteal connective-tissue layer, which lines the interior of the vestibule as well as the plate of the stapes, also stretches over the recess in question, whilst horizontal sections through the vestibules of macerated bones give a more pear-shaped figure (compare Henle). Moreover, the roof of the vestibule in fig. 9, in connection with its anterior wall, which passes directly over into the plate of the stapes, shows a certain amount of regularity, as is also the case with the floor of the vestibule in fig. 10. If we combine now the configuration of the three sections, the vestibule will appear as a concavity, which we may compare, as it were, to an upright elliptical spheroid, or imagine that it had been produced by revolving the elliptical section in fig. 10 around its major axis.

I would, however, call especial attention to the free space, *v k*, fig. 11. We see the utriculus, in figs. 1 to 6, always united at the same spot (fig. 1, *e*) to the periosteum of the vestibule by connective-tissue fibres. It is also probable that the rest of its circumference is fastened by more yielding fibres, which have, however, become loosened in making the sections (compare also the attachments at the roof, fig. 9). Traces of ruptured fibres are also found on the periosteum as well as on the utriculus (compare fig. 11). The fibres designated at *e*, seem, however, to be especially firm, since they are seen in six consecutive sections. In Nos. 7 and 8 they are no longer visible; the tissues were probably too yielding to produce perfect pictures, as is also evident from the section of the wall of the utriculus in fig. 8.

The sheath which accompanies the nerve (starting from the periosteum and passing on to the wall of the utriculus) forms the medial boundary of the space *v k*, on the cochlear side, and can even be seen extending beneath the entrance of the nerve (figs. 6, 7, and 8) as a connective-tissue



diaphragm. It has been preserved, though in a defective condition, in figs. 7 and 8. Further downward, it seems to support the utriculus in position,

The space which we have mentioned, and which, moreover, lies adjacent to the anterior wall of the vestibule, *resp.*, the plate of the stapes, does not show any strengthening fibres, or even remnants thereof, in any of the figures. It is, moreover, probable, on grounds of fitness, that the plate of the stapes and the utriculus are not united by connective-tissue fibres.

Here, then, we have a sort of "anterior chamber," filled with perilymph, with dimensions increasing as well from above downward as from the lateral to the medial direction. For, as the diameters of the horizontal sections of the vestibule increase as we pass downward in the district just mentioned, those of the utriculus decrease, so that the size of the anterior chamber is increased in a twofold manner from above downward. Thus, at the upper edge of the fenestra ovalis, the *greatest distance* from the macula to the anterior wall of the vestibule measures 0.56 mm., while in fig. 8 the *least distance* between the anterior wall of the utriculus and the plate of the stapes measures 1.5 mm. Moreover, the vertical section, fig. 9, shows that this distance increases still more in a downward direction, as far as the *lower edge* of the plate of the stapes, while finally, the horizontal sections, figs. 1-8, demonstrate that the *smallest distance* always corresponds to the *lateral margin* of the plate of the stapes, and increases from there toward the cochlea.

*These topographical relations demonstrate that in operating in the region of the fenestra ovalis, we should be very careful in our movements near its upper edge, especially in the lateral portion, on account of the proximity of the macula of the utriculus. On the contrary, at the level of the lower edge we find a space which is only filled with perilymph, and would consequently allow the ligamentum orbiculare to be punctured (with greatest security in the medial half of the lower edge) without endangering the utriculus or the nerves of the vestibule. The sacculus also is moderately well protected in the*

*recessus hemisphericus, and would not be endangered by a puncture in the region named.*

In case the conformation of the auditory meatus allowed the passage of an instrument as far as the fenestra ovalis, this path might be used for the evacuation of hemorrhagic or purulent effusions in the vestibule, by means of a very fine canula or by aspiration, as has been suggested by Knapp.<sup>1</sup> The same canula could be used for the injection and subsequent removal of various medicated fluids. Even the presence of an imperforate *Mt* need not offer absolute hindrance to such an operation, for we could perforate its posterior portion with a trochar, remove the point, and then use the upper wall of the promontory as a guide for conducting the canula (compare fig. 9). It would also be desirable to experiment on subjects, with accurate determination of the angle of the head to the horizontal plane, in order to discover the point of election for perforation.<sup>2</sup> The desire which has been so long and so universally cherished of reaching, by surgical means, those affections of the inner ear which are inaccessible to our present medical treatment, must serve as an excuse for the boldness of any suggestions in this direction. But so long as an accurate knowledge of the topographical anatomy of the parts concerned in every surgical operation is of the first importance, I hope that this paper may fulfil its aim in this respect at least.

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<sup>1</sup> These ARCHIVES, vol. ii, part i, p. 281.

<sup>2</sup> Illumination by means of the electrical otoscope might be advantageously resorted to in case of a transparent *Mt*. Compare Zaufal, *Archiv für Ohrenhkte*, Band xvi, Abth iii, p. 188.

HISTORY OF A CASE OF HEMORRHAGE FROM THE  
EAR, PROBABLY DUE TO A FRACTURE OF  
THE SKULL.—RECOVERY.

By J. D. RUSHMORE, M.D.

On July 21, 1881, I was asked to see a gentleman about 68 years of age, who, without more than a peculiar uncomfortable feeling in his head for a few minutes preceding his injury, had been seen, July 17th, to fall backward and toward the left side, in the street, and had lost in a few minutes about sixteen ounces (by estimation of a physician) of venous blood from his left auditory canal. He was taken to his home, tossing his arms and legs about with some violence on the way, and putting his hand to his head. He regained his consciousness in part in a few hours, and was able to answer questions coherently. He complained of headache, referred to left frontal and left temporal regions, with vertigo every ten or fifteen minutes whether lying still or moving, most marked, however, while turning the head, which he did with the greatest deliberation. His respiration had not been affected; his temperature was  $98\frac{3}{4}^{\circ}$ , his pulse 55. Bowels had acted in response to medicine; his urine during the day following the accident amounted to only seven ounces, contained about 5 per cent. albumen, a moderate number of hyaline and coarsely granular casts, and had a specific gravity of 1020.

He had always been an exceedingly methodical and a constantly occupied man, suffering from no organic disease. The character of the urine within a week or ten days became entirely normal, and remains so still, so that the renal condition may be eliminated from the case, whatever relation it bore to the original seizure, whether causal or consequent.

At my first visit I found the patient perfectly rational and able

to state clearly the symptoms of which he complained. They were the vertiginous attacks above mentioned, frontal headache severe at times, tenderness in front of, beneath, and behind left auricle, dulness of hearing in left ear. Objectively there was a slight œdema of left mastoid, a narrow ecchymotic spot extending from the mastoid toward the styloid process beneath the auditory canal, a hyperæmic auricle, a soft clot filling the canal, which was found to be much swollen and tender, especially forward and downward, after the clot had been removed. There had been no hemorrhage after first attack, nor was there any serous discharge. Hearing distance for the voice, 3 feet; watch, nil; tuning-fork heard well, better through the bones; right ear: voice, perfectly; watch, 1 inch; tuning-fork, better than with left and better through the bones. Right *Mt* slightly sunken and cloudy. Left *Mt* could not be seen on account of swollen condition of walls of the canal. There was a small, round, bright, and motionless reflex at bottom of canal. Both Eustachian tubes were patent; the air entered each ear easily and with no difference in sensations, except that in the left ear pain was produced all about the ear. Pulse, 50; temperature, 99°; respiration, 16; slight numbness of third and fourth fingers of right hand. This symptom has disappeared under the interrupted current.

The further history of the symptoms is:—

*July 27th.* Discharge of thick and very offensive pus of good color from ear. Hearing distance, 6 feet. Pain diminishing, œdema less, ecchymosis disappearing, vertigo less, some delirium while asleep. Seems to have little idea of passage of time, asking to have pulse taken just after it had been taken, asking when medicine was to be given again immediately after it had been administered, etc., etc.

*Aug. 1st.* Discharge very slight; canal still much swollen anteriorly and below; a small red granulation visible in upper wall of canal, deeply situated; could find no opening to bone through it. Temperature, 99°; pulse, 40–50, sluggish, but regular. Other ear symptoms improving; mental disturbances more marked; difficulty in recalling words; a suspicion, but nothing more, of left facial paralysis. This symptom attracted no further attention. Sleeplessness most troublesome symptom.

*Aug. 7th.* Discharge stopped; granulation on roof of canal gone; swelling and tenderness continue in canal; hearing distance, 8 feet; watch, nil; middle ear easily inflated by Valsalva

without pain ; appearance of integument over mastoid, normal ; no tenderness ; soreness when pressure is made over styloid process ; other head symptoms improving.

*Aug. 15th.* Sitting up and walking with assistance ; reading with pleasure. From this time there was a gradual improvement in all the symptoms.

*Aug. 25th.* Hearing distance was 15 feet, but *Mt* cannot be seen except upper and posterior part, which is of good color and is a little moist.

*Sept. 10th.* To-day, for first time, can see the whole *Mt*. The only additional light thrown on the case is the existence of a red irregular line, broad peripherally and narrowing toward the centre of membrane, extending from apex of light spot to the end of the malleus handle. The rest of the membrane looks as well as the right *Mt*.

*Sept. 25th.* The redness of line described above has entirely disappeared, and the color is like that of a thin, newly formed membrane ; the light spot is also extending up along the upper edge of the line in a faint streak of light. There is no tinnitus. The hearing distance for the voice is 15 feet, for the watch (loud ticking) contact ; the tuning-fork is heard not quite so well as with right ear, and better through bones than through the air. In all respects except the slight dulness of hearing in left ear the patient is as well as before he fell. The pulse, normally slow (about 50), has ranged rather below than above that number ; his temperature has generally been normal, once reaching  $99\frac{1}{2}^{\circ}$ , and two or three times  $99^{\circ}$ .

The treatment of the ear consisted in cleansing the canal, leeches to mastoid, warm applications external—the douche was objected to,—oleate of morphia in front of and behind auricle. After the patient was up and about, Politzer was used three times—each time with the same result—to dull the hearing power for conversation for the whole day, nor was there any improvement on the day following. As regards the general treatment, the most urgent symptom was sleeplessness, which was relieved at first by opium, potass. br., chloral, hyoscyamia, etc., and afterward better by rum, camphor, etc. Digestion was carried on well during the entire time, and other medication was largely expectant.

The point of especial interest in the case reported above was as to the source of the bleeding and the extent of the lesion.

From the symptoms as obtained by first examination it seemed as if there had been a fracture beginning in the external auditory canal and extending downward and forward, and that the hemorrhage had come from the internal jugular vein, and that the membrana tympani had not been ruptured. The subsequent progressive change in the appearance of the *Mt* proves that the membrane had been ruptured, and confirms, as far as it can, the probability of a bone lesion downward and forward. Of course it is well-nigh impossible to account for the sudden loss of blood in such quantities from this direction; but it is quite as difficult in the direction of the lateral sinus, in view of all the symptoms, positive and negative.

Further impressions would be only in the line of comparatively valueless speculation. The reporter cannot help sharing in the opinion that the loss of blood was conservative as regards the life of the patient.



## OTOMYCES PURPUREUS (WREDEN) IN THE HUMAN EAR.

By SWAN M. BURNETT, M.D.,

LECTURER ON OPHTHALMOLOGY AND OTOTOLOGY IN THE MEDICAL DEPARTMENT OF GEORGETOWN  
UNIVERSITY, AND OPHTHALMIC SURGEON TO THE CENTRAL DISPENSARY AND  
EMERGENCY HOSPITAL, WASHINGTON, D. C.

IN an article on "myringo-mycosis aspergillina," published in No. I, vol. iv, of these ARCHIVES, Dr. R. Wreden, of St. Petersburg, relates one case which was, up to that time, unique in his experience. In my examination of the literature of fungoid growths in the ear I have not been able to find a similar one related, and as the appearances of the growth as described by him are so different from any thing yet reported, I am led to believe that it would not be without interest to place another on record.

Mr. J. H. B., 55 years of age, has had an impairment of hearing for a large number of years. He is now able on either side to hear a loud voice only at a distance of a few inches from the ear. There has been no special pain and no discharge connected with his deafness. For thirty years he has been affected with what his physician called "psoriasis inveterata," and it has involved at successive periods every portion of the surface of his body. It affected the *right* auditory meatus some years ago, but there are now no evidences of its presence there. Recently it began to trouble him in his *left* ear. There were formation of scales, itchiness, and a burning sensation. To relieve these unpleasant symptoms he poured into the meatus on that side a solution composed of

Tinct. opii	.	.	1 part
Sweet oil	.	.	2 parts
Glycerine	.	.	2 "

Within a few days after he commenced the use of his remedy he experienced some pain and a sense of heat and soreness in and about that ear ; so much so that it was not comfortable for him to lie on that side. His hearing power in that ear was at the same time diminished very markedly in clearness, and the ear had a feeling of being stuffed full of something. An inspection by means of the mirror revealed a plug of dark red, quite consistent matter, which had all the appearances of a clot of dried blood. I removed it without difficulty, by means of the syringe, and found the walls of the meatus intact, though red and rather infiltrated, and the drum-head thin and very much sunken. He experienced relief after the removal, and his hearing, though not materially improved as to distance, was more distinct and clearer.

The removed mass was then examined, and any one, on a simple macroscopical inspection, could easily have been misled into the belief that it was a dried blood-clot. On questioning the patient, however, he stated that at no time had there been any hemorrhage nor was there any ulcer or break in the skin of the meatus from which blood could have come, nor did any fresh blood follow the removal of the mass. On a more careful inspection of the walls of the meatus I found near the mouth of the canal a thinner layer of bright red substance, which was detached by means of the forceps, but whose removal was not followed by hemorrhage. This led me to make an examination of a portion of the mass under the microscope, and to my surprise I found the structure of some kind of fungoid growth, the like of which I had never seen before. Desiring to study the case further under the most favorable circumstances, I ordered nothing to be put in the ear, but sent the patient home with the request that he call in two days for a further examination. To make the clinical history complete and connected I will state here that on his return at the end of that time I found a thin layer of the same bright red substance on the walls of the meatus, but not on the *Mt.* This was evidently *new growth*. It was removed and laid aside in glycerine for examination. I then gave him 95 per cent. alcohol to drop in his ear, and there was no further formation of the fungus, and in the course of a week all his disagreeable symptoms of pain, heat, and soreness had disappeared. He did not wish to undergo any treatment for his chronic dry catarrh, as neither he nor I believed any material benefit would come of it.

*Microscopical appearances.*—The mycelium of the fungus is more delicate than that of *Aspergillus nigricans* or *A. flavescens*, and is septate. The fructiferous hyphens are larger and have a double contour, but are much shorter than in either of the above-named varieties of *Aspergillus*. Instead of conidia with sterigmata we have *asci filled with spores*. The walls of the asci are of double contour, but the two lines are not always parallel and vary in thickness at different parts. They are much larger, almost twice the size of the conidia of the *Aspergilli*. The *spores* with which the asci are filled are somewhat larger than those of the *Aspergilli*, and in some (the younger?) are round and without contents. Some of the asci (the older?) are of a deep red or purple color, the coloring matter seeming to have its location in the cell contents. Others are of a pale yellow color. The *free spores* differ from those contained in the asci in several important particulars. As a rule they are larger, and the greater part of them have what corresponds to a nucleus in cells. This nucleus, when it is single, usually fills more than half of the interior of the spore, and its wall is generally parallel to that of the spore. In this condition the spore is for the most part round, though there is often a tendency to a pointed elongation at one end. The majority of these free spores—particularly in the parts where the mature asci are abundant—have no prolongations. But in those parts which are apparently younger there is very often observed the beginning of what seems to be mycelium or a hyphen. In some of these free spores, too, which are larger than the others, there is observed a division of the central nucleus into two or three or more parts. In fact, a careful examination of a large quantity of the mass showed all sizes of asci, from the largest mature one to the free spore which had apparently just issued from a sporangium.

*Nowhere throughout the whole mass were any conidia or sterigmata to be seen.*

The coloring matter was by no means confined to the sporangia, but in the older portions was diffused throughout the mass; even the epithelial cells were beautifully and evenly stained by it. The appearances of the sporangia,

spores and mycelium are very well represented in the plate accompanying Wreden's paper, and to this we would refer those readers who desire to be acquainted with the microscopical appearance of the fungus.

Is this a new fungus, or is it a new form of one of those already known as having their habitat in the human ear?

Wreden discusses this question very fully in his paper, and, basing his opinion on an examination of his specimen by H. Woronin, comes to the conclusion that it is the *asceous form* of the *Aspergillus nigricans*. He says: "After I had been put in the right path by the explanations of H. Woronin, I again investigated the false membrane which had been removed from the ear, upon the supposition that perhaps some conidianiferous elements or stylophores might be found in it, which would serve to determine whether the perithecal fruit, or asci, which had been found belonged to the *Penicillium* or to the *Aspergillus*. My expectations were not disappointed. In the interior of the false membrane I found several places which were characterized by a dark, almost black color, and were readily distinguishable from the surrounding dark-red mass. I examined these spots by the aid of the microscope, and found in addition to a number of germinating spores and ripe utricles or asci, completely developed stylophores or conidia of *Aspergillus nigricans*. There can be no doubt, therefore, that in this case of myringo-mycosis the aspergillus in the ear had attained its highest form of development; for not only had conidia or stylophores been produced, but also utricles or asci had been developed. This case, therefore, is unique, and possesses all the greater interest, because heretofore the utricular form of the fructification of aspergillus, *i. e.*, spores arranged in sacs, or asci contained in a perithecium, has never been found in any organ of man or beast. *The ascomycete of the Aspergillus nigricans, that is, the highest form of the specific aural fungus, is herewith made known.*" In regard to the development of the asci, he says: "If all the external conditions requisite for perfect development are present, the mycelium first produces the stylophores and, later, when they are near the termination of their de-

velopment, asci are produced, with the ripening of which the mycelium and the entire fungus layer assumes a yellow or yellowish red color, that is, an altogether different appearance. If, on the contrary, the external conditions are only partially supplied, the development of the aspergillus will be incomplete, that is, the mycelium will produce only conidia and no asci. The converse of this, namely, the production by the mycelium of asci only, and no conidia, has never yet been found. Before the correlation of these two forms of fructification was known, they were considered organs of two widely different kinds of fungus, and the form corresponding to the ascophores was named *Eurotium*, and the other, the conidianiferous form, was called *Aspergillus*. So far the *Aspergillus* has been found in the ear of man and beast only with conidia, and never with the asci."

It will be seen from our report that nowhere did we find conidia, conidial spores, or sterigmata—in fact, there were no evidences whatever of the presence, in *any* stage, of any of the ordinary forms of aspergillus. If the *Otomyces purpureus* is, indeed, only the perfect form of an aspergillus, we should expect to find at the earlier stages of its growth the characteristic form of the *Aspergillus* fungus. Instead of cultivating the fungus on some extraneous substance, we allowed it to grow on its natural habitat for the purpose of discovering, if possible, a connection between it and one of the varieties of *Aspergillus*. We were not successful in this. We found at no stage of its growth any thing but the *Otomyces purpureus*. We are, therefore, by the process of exclusion, compelled to consider this fungus as *sui generis* in so far as it was not possible to connect its growth and development with any other form of vegetable fungus. How, then, can we account for the conidia of *A. nigricans* found by Wreden in his specimen? If it was not, as he supposes, the first stage of the *Otomyces purpureus* it must have been of accidental occurrence, which is not at all an impossible thing. There would seem to be nothing to prevent two allied forms of fungus from growing on the same ground. Not willing, however, to trust our own opinions or observations on the subject, we sent a quantity of the mass

to Prof. W. G. Farlow, of Harvard University, the highest authority on mycology in this country. He was kind enough to examine the specimen and write me his opinion of it, which I give in full:

"\* \* \* \* It having been suggested that the specimen you sent might be the ascosporic form of *Asp. nigrescens* Robin, or *Asp. flavescens* Wreden, I have made a comparison with those species. It is assumed by most botanists that the *Asp. nigrescens* of Robin is the same as the *Asp. niger* of Van Tieghen and Brefeld,<sup>1</sup> a species since placed by Van Tieghen in *Sterigmatocystis*. Of that species I have both European and American specimens of the conidia, and a specimen of the sclerotia (which are supposed to produce asci) from Rabenhorst's Fungi Europæi. I enclose a fragment of the specimen in Rabenhorst. Your specimen shows no conidia, nor, as far as I can see, any conidial spores. Certainly there are none of the echinulated spores of *A. niger*. By comparing with the specimen sent, you will see that the sclerotia sent by you do not resemble those found by Wilhelm, who furnished the specimen in Rabenhorst, to belong to *A. niger*. Although believing your fungus to be an Eurotium which in all probability has conidia which would be classed either in *Aspergillus* or in *Sterigmatocystis*—which is merely a genus of fungi differing from aspergillus in having branching sterigmata,—it seems to me that your fungus is certainly different from *A. niger* which, as I have said, is supposed to be the same as *A. nigricans* (Wreden).

"Of *A. flavescens*, said to be the same as *A. flavus* (Brefeld), I can only say that as your fungus has no conidia I have been unable to compare it directly with that of Brefeld, which I have in Rabenhorst, No. 2,155. Wilhelm describes the sclerotia of *A. flavus* as 'minuta, nigra, tuberosa.' He also says, 'Die Sclerotien sind klein und erscheinen dem freien Auge schwarz, auf der Schnittfläche röthlich-gelb. Unter dem Mikroskop zeigt sich ihre drei bis vier, stellenweise auch mehr schichtige Rinde aus dickwandigen, lebhaft

<sup>1</sup> Wreden states (*l.c.*) that Robin had examined specimens of his *A. nigricans* and declared it distinct from the *A. nigrescens*.



dunkelbraun gefärbten Zellen gebildet. Die Zellen des Markes sind mit sehr dicken, stark licht brechenden, gelblich schimmernden Wänden versehen.'

"I have no specimen of the sclerotia or peritheca of *A. flavus*, and only know the description of Wilhelm. It is possible that your fungus is the *A. flavus*, but my specimen differs in several respects from Wilhelm's description, and I think it doubtful whether the two are identical, however. There remains the *Sterigmatocystis purpurea* of Van Tieghen, with which your fungus should be compared. I only know species from Van Tieghen's account in the *Bull. Soc. Botan. de France*, T. 24.

"In short, it seems to me that what you sent is not a form of *A. niger*, and probably also not a form of *A. flavus*. Beyond that I can only say that I am unable to connect the specimen with any known *Aspergillus* (including *Sterigmatocystis*), but that it is an *Eurotium*, either entirely new or, what is perhaps more correct, hitherto insufficiently described.

"I would remark that Woronin is an excellent botanist, and his opinion, although, as stated in your letter, different from mine, should have great weight."

Where two botanical authorities like these disagree who shall decide? As, however, only two specimens have thus far been examined and reported, we should await further investigation before forming definite theories on the subject. If it is permitted to one who is not a professed mycologist to offer an opinion, based, however, on a careful examination of one specimen, I would say that it does not seem at all probable that the *Otomyces purpureus* is in any way connected with either of the two forms of *aspergillus* which have up to this time been found in the ear. So far as I have been able to study its growth and development, it seems to assume the asceous form from the outset. As regards the various steps of its growth, further observation is required, which it is hoped some investigator may furnish ere long.

In this connection it seems to me that the variety of vegetable fungus found in the ear might depend, in some

degree, on the material supplied for its growth, as well as on the nature of the ground in which it takes root. How far the psoriasis and the particular mixture which the patient put into his ear influenced the kind of fungus growth we have had under consideration, is a question of no inconsiderable practical as well as scientific interest, and experiments and observations in that direction are highly desirable.

## EXOSTOSES OF THE EXTERNAL AUDITORY CANAL.

By S. C. AYRES, M.D., CINCINNATI.

THE study of exostoses of the external meatus is one of interest to the aurist, although not of much practical importance in every-day practice. They are seen so rarely that they may be classed among aural curiosities. In looking over cases reported in books and journals there seems to be a good deal of uniformity in their development. They may spring from any portion of the canal, but preferably from its posterior wall. They also arise from its upper as well as its lower wall. A number of cases are reported where two and even three exostoses are found growing from different portions of the same meatus. We also find both ears of the same individual symmetrically affected.

If we may judge from the examination of the crania of some prehistoric nations and from the cases we see in ordinary aural practice, we might justly conclude that the disease in question had been much more common in ages gone by than it is at the present time. Dr. Clarence J. Blake, of Boston, in vol. 2, *American Journal of Otology*, Part II, gives the results of examinations made by him of one hundred and ninety-five crania taken from the mounds of the Cumberland Valley, Tenn. In eighteen per cent. exostoses were found in one or both canals. He also examined one hundred and eight California crania and found five per cent. similarly affected. He made a further examination (vol. 2, Part IV) of thirty-seven crania from the mounds of St.

Francis River, Arkansas, and found seventeen per cent. with exostoses of the external meatus.

Dr. F. W. Langdon, of this city, in a recent paper on the Madisonville Prehistoric Cemetery, reports his examination of eighty-three crania in five of which he found bony growths in the canal. In three of these cases the exostoses were limited to one side, and in the other two they occur in both ears. In one skull the meatus is so obstructed by these growths that its lumen is quite obliterated on one side and nearly so on the other.

A few years ago Prof. Seligman made an examination of American skulls in European collections, and discovered that exostoses of the external auditory canals must have frequently occurred among those nations where the head had been elongated by pressure during infancy.

It would seem from examinations made so far that the prehistoric races and the Indians and their progenitors were more frequently affected with these bony growths than are the Europeans or Americans of the present day.

So far as my personal observation goes I should say that exostosis of the external meatus was rare in this country. Among a large number of aural patients I can now recall but four cases. In three of them there was a single bony tumor growing from the wall of the meatus, and in the fourth case there was complete closure of the canals with an ivory-hard bony septum.

CASE 1.—My first case was a medical gentleman, Dr. K., who was aware of a bony growth and called my attention to it. It was a rounded bony protuberance springing from the posterior wall of the meatus. It almost closed the lumen of the meatus. He had been aware of its presence a number of years, and was occasionally annoyed by cerumen and epidermic scales filling up the almost closed passage. He writes me that he thinks it has grown slowly during the last ten years.

CASE 2.—Mr. B., 22, a healthy, well-developed man who had never suffered from any ear trouble, suddenly became deaf in one ear. Examination revealed the presence of a large exostosis growing from the posterior wall of the meatus. The space between the growth and the walls of the meatus had become closed

with cerumen, and marked deafness followed. He could hardly believe that the growth had been there several years and possibly was congenital. He went abroad for further advice and consulted Profs. Politzer and Moos.

CASE 3.—Mr. A., aged 30, has an exostosis springing from the lower and posterior portion of the meatus. It partly fills the canal, but in other respects gives him no trouble. He had a middle-ear catarrh but never had any discharge.

In neither of these cases is there any history of previous aural trouble accompanied with an otorrhœa.

CASE 4 is one of special interest, as the characteristics are quite different from the others. Mr. H. A. C., aged 28, a healthy and powerfully-built man who had always enjoyed excellent health, gave the following history in brief :

He had scarlet fever when about five years old, which was followed by chronic suppurative inflammation of both middle ears, which continued for several years. At times the discharge was scant, and at others, profuse, bloody and very offensive. The otorrhœa continued in the right ear till 1866 when it ceased, and in the left ear till 1873. His hearing has been variable; at times moderately good, and then again duller. Since the cessation of the discharge his hearing has gradually grown worse. His hearing distance in the right ear was  $\frac{1}{8}$ " , and in the left ear  $\frac{1}{16}$ ". He could hear ordinary conversation carried on with one person tolerably well, but mingled voices confused him very much. Examination of the meatus revealed the fact they were occluded with a bony septum. The septum in each was about half an inch from the posterior border of the cartilaginous canal. The external surface of both was concave and covered with epidermis. The central portion appeared whiter than the periphery. Pressure with a probe showed that the surface was quite smooth. It was somewhat sensitive to pressure, but not more so than the ordinary exostoses which spring from the walls of the meatus.

Upon inflation of the middle ear he was aware that air entered the ears, but whether it impinged on the drum membranes or on the bony septa it was impossible to determine. No improvement in hearing, however, resulted.

He was anxious for relief if it could be given, and the question of surgical interference became one of the greatest importance.

The literature on the subject at my command furnished only one similar case, that of Bonnafont (*Monatsschrift für Ohrenheilkunde*, vol. ii, No. 8), which had been operated on. It was perforated with a rat-tailed file and remained open several years. In all other cases operated on the histories distinctly stated that the growth sprang from some portion of the wall of the meatus and encroached upon the opposite wall and thus threatened complete closure.

The case of Dr. L. B., of Hamburg (*Archiv für Ohrenheilkunde*, vol. x, p. 110), operated on by Dr. Knorr, is one of this kind. The brilliant and successful case of Dr. Mathewson, of Brooklyn, where he used the dental engine, is another one where the growth was extending across the meatus and was likely to result in its complete occlusion if not in something more serious. Here was a case with both canals closed with a bony growth, and where some surgical interference seemed entirely justifiable.

I decided to adopt Dr. Mathewson's plan and try the dental engine on the left ear, which was the poorer one. I applied to Dr. W. S. How, of this city, a very skilful and ingenious operator, for his assistance. I selected some drills, and Nov. 29, '80, with the assistance of Drs. E. Williams and Sattler, I made the first attempt to perforate the septum. The skin had been previously removed by the use of chromic acid, so that the drill came directly upon the bone. Dr. How managed the dental engine, and with a forehead mirror I was enabled to illuminate the meatus. Mr. C. preferred not to take an anæsthetic, so that we had to proceed slowly on account of the pain. I soon found that the shank of the drill was too short and that the drill itself wobbled too much, not being firm enough in its socket. But little progress was made, and it was soon decided to wait a few days and have some other drills constructed. There was but little hemorrhage. The growth was *extremely* hard,—in fact, as hard as ivory,—and the drill seemed to make but little impression on it.

*Dec. 4th.*—We made another attempt with the new drills which had sufficiently long shanks to enable one to see the point of the drill while it was in contact with the bone. He stood the operation very well, but as it necessarily proceeded slowly on account of pain it soon became unbearable, and he asked us to desist and he



would take an anæsthetic some other time. But little reaction followed, and a few days later we attempted to complete the operation under the influence of an anæsthetic. Ether was first administered, but it was impossible to anæsthetize him completely. He became wild and unmanageable, and it acquired our combined strength at times to hold him. Chloroform was resorted to, and while it did better, yet it did not act kindly. When he became profoundly anæsthetized, threatened asphyxiation came on and we had to desist. I improved every moment of quiet which he had to go on with the drilling. It was extremely difficult with such an unmanageable patient, for I was now nearly through and was afraid of doing some damage to the middle ear in case I perforated suddenly. At last I felt the drill perforate, and could have enlarged the opening with larger drills, but the patient had now been under the influence of the anæsthetic about twenty minutes, and was so wild and unruly we thought it prudent to stop.

There was some hemorrhage from the meatus, but it soon ceased. Some suppuration from the external ear followed, which continued for several days. The bony septum was now exquisitely sensitive, but with a probe I could see that it was about 5 *mm.* thick. His hearing distance was slightly increased and made equal to the right ear. He had to leave the city a few days later, but a letter dated Jan. 12, '81, stated that the suppuration had ceased and that his hearing distance was as good as when he left the office.

I felt that it was only the part of prudence to move cautiously in such a case, not having a similar one to judge by.

In exostosis from the wall of the meatus the supposition is that there is a drum membrane behind it, and this is demonstrable in most cases, and it is not difficult to estimate about how far one would have to drill. In this case, however, these points were not clear. It was not certain that there was a drum membrane at all, and the bony septum was so deep it was difficult to reach it with a drill and at the same time regulate its effects. There was constant danger that the sudden and violent movements of the patient as the drill neared the opposite side would cause it to do some damage to the middle or possibly the internal ear.

Exostoses are either congenital or acquired. How many

are really congenital it is impossible to say. There may be many irritating causes in infancy and childhood,—furuncles, suppurations, injuries, etc., which may furnish the nucleus for the future but very gradual development of the growth, and it is possible that this growth may cease with the development of the system and remain stationary. Early troubles in the ear are often forgotten or overlooked by the parents, and consequently unknown to the children, so that the histories of cases are likely to be imperfect.

Dr. Burnett in his excellent work on Diseases of the Ear, p. 320 (1877), reports a case very similar to that of mine. It is one of acquired bony occlusion of the external meatus with a previous history of suppuration and development of polypus.

In Toynbee's work (2d Am. ed., p. 145) he gives a wood-cut of a case where the auditory canal is nearly closed with a bony development. He first saw the patient in June, 1847. He then had a polypus which nearly filled the canal. It was removed; the discharge ceased and did not return for ten years. In July, 1857, the patient again presented himself, complaining of a slight discharge from the ear. On inspection the canal was found almost filled with a bony growth which had so far closed that now only a small triangular opening remained.

In Dr. Mathewson's case there was a history of pain in the ear until she was eleven years of age, but without discharge. Since then she had had a sense of fulness in the ear.

In the case of Dr. L. B., of Hamburg, he did not discover the growth until he was forty-three years of age, so that there is a fair presumption that it may have been congenital, as he had had no discharge. It had never given him pain previous to the time he discovered it. His attempt to remove the supposed foreign body from his ear caused some inflammation which subsided, and he experienced no further trouble for four years, when he became aware that the exostosis was increasing in size. What relation the previous inflammation had to the subsequent growth of the exostosis must remain an undetermined factor in the case.

Prof. Moos, of Heidelberg, in vol. viii ARCHIVES OF OTOL-

OGY reports a case of closure of the auditory meatus and loss of hearing by the formation of exostoses. The patient had never had any disease of the ear, but became totally deaf on the right side within two days. Examination revealed "a large globular exostosis (*a*) springing from the posterior wall of the ext. aud. meat. and completely filling its whole calibre. This exostosis bears on its upper circumference a second smaller one, resting upon the larger with a broad base, and running somewhat to a point in the direction toward the upper wall of the meatus. Its surface is dull-white, while the cutaneous envelope of the large exostosis appears red and thickened. The gap which the large globular exostosis still leaves open in front and upward is filled (*b*) by a more club-shaped exostosis running toward the anterior and upper one in a circular direction, with its thinner portion extending downward and its thicker portion upward; between this and the anterior upper surface of the large globular exostosis is a small hollow, through which, however, it is impossible to penetrate any deeper inward with the probe. The cutaneous envelope of *b* resembles that of *a*." He considered it a case of *acute closure* of the ext. aud. meat. due to the presence of bony excrescences.

An expectant plan of treatment was adopted. Rods of laminaria were introduced. Their presence caused violent pain and excited a growth of granulations which were removed by the snare and the galvano-cautery. In the course of treatment there occurred a perforation of the drum membrane. About two months later the inflammation had subsided and the discharge ceased, and he states that *the anterior exostosis had disappeared*. In the space above the large exostosis the anterior upper quadrant of the memb. tymp. could be seen.

The hearing had greatly improved, being now almost equal to that of the other ear. Prof. Moos attributes the destruction of the exostosis *b* principally to the effects of the galvano-cautery.

A remarkable case of exostosis in the ear is reported by Dr. Hedinger, of Stuttgart, in ARCHIVES OF OTOTOLOGY, vol. x, No. 1. He says that the chapter of the exostoses is

still rather dark—their pathogenesis being as yet entirely unknown. He finds the new formations frequently associated with chronic tubal catarrh or suppuration. In the case in question there was great swelling of the mastoid process with forward and outward displacement of the auricle.

"The meatus was filled with a hemispherical, immovable new-formation of osseous consistence, starting from the upper and posterior wall of the auditory meatus." Rods of laminaria were daily introduced into the canal with most satisfactory results. The mastoid complication necessitated a free Wilde's incision, which gave exit to a large amount of retained pus. He removed a small piece of necrosed bone from the lower wall of the auditory canal, and by the use of the chisel obtained several small particles from the lower third of the tumor. After a microscopic examination of these he makes a diagnosis of "inflammatory proliferation of the papillæ and of the connective tissue, with deposition of lime within it (osteoid metamorphosis)."

At the International Medical Congress held in London last August<sup>1</sup> the question of morbid growths within the ear was freely discussed by the section on Diseases of the Ear. An exhaustive paper on the Etiology of Aural Exostoses was read by J. Patterson Cassells, of Glasgow.

In his judgment exostosis is nearly always complicated with another affection of the ear, past or present; while hyperostosis may exist in the meatus with normal hearing. For the removal of the former he recommends the gouge, and for the latter the dental engine.

Dr. Guye (Amsterdam) had seen a case of multiple exostoses united by an osseous bridge, which he removed, and Dr. Loewenberg (Paris) a similar case, where he had resorted to the galvano-cautery. Dr. Knapp, in one case, had successfully used the chisel.<sup>2</sup>

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<sup>1</sup> Compare on this subject two recent papers: DELSTANCHE fils, *Contributions à l'étude des tumeurs osseuses du conduit auditif externe*, Bruxelles, 1879; and A. LUCAS, *Removal of exostoses in the ear canal*, *Arch. f. Ohr.*, xvii, p. 246.—Ed.

<sup>2</sup> (See Report in these ARCHIVES, vol. x, p. 297, etc.)

## CLINICAL CONTRIBUTIONS TO OTOLOGY.

BY C. R. AGNEW, M.D., AND DAVID WEBSTER, M.D.,  
NEW YORK.

CASE I.—*Binaural deafness, probably due to simultaneous exudations into both labyrinths.*

Joseph R., æt. 40, came under observation December 14, 1874. The following letter which he brought with him from his family physician, Dr. John Messenger, contains important facts in the history of his case.

"The patient, Mr. J. R., came to consult me July 6, 1874. He was then, and had been, living on Eightieth Street, a little west of Broadway, in a frame house, rather old, and surrounded with a growth of shrubbery, fruit-trees, vegetable garden, etc. He and his family had resided there for several years, and all had had good health up to the time when Mr. R. was attacked (July, 1874) with a severe ringing sound in the ears, which came on suddenly without pain or severe general or local distress. There was quite a severe nervous derangement, if I may so term it. He was very weak and depressed. Deafness, almost total, was a symptom from the first. A loud and rather base sound was not heard as well as a sound of high or acute pitch. The shutting of a door, or something falling on the floor and making a shrill noise would startle him, and make him start up in a fright. A very careful survey of his person, ocular inspection, palpation, auscultation, analysis of the urine, chemical and microscopical, the constant and interrupted currents of the faradic and galvanic batteries, all failed to indicate the locality of any diseased structure. Malaria came in for a share in the cause of the trouble, but there, too, I failed in my efforts to convict the offender. He is a man of good, temperate, regular habits, and always has been so."

Mr. R. gave me the following account of the way in which his trouble was ushered in. About the first of July, while riding down Broadway in a horse-car, he thought he heard a fire-bell ringing, and said so to his wife. She replied that she heard nothing of the kind. Presently he heard the bells ringing again, but as his wife did not hear them he was forced to the conclusion that the sounds originated in his own ears.

These sounds, with many variations, have persisted in the most distressing and annoying manner ever since. During the summer, while sitting in his garden, noises of bats, owls, and frogs were repeated in his ears. Again the most furious steam-pumping sounds would be heard.

The hearing of both ears was impaired from the first, but he was able to hear conversation for several months. The hearing of the right ear was very gradually lost first, and that of the left went in the same way a few weeks later. He had been unable to understand spoken words for three or four weeks when he first came under our observation. He never lost the power of hearing certain external sounds, such as his parrot saying "cuckoo." He is very nervous, certain noises going through him like an electric shock. His voice is somewhat raised in pitch, and not under good control. The tuning-fork is heard very faintly when placed in contact with his teeth. So far as could be determined by inspection his external and middle ears were normal. His Eustachian tubes were easily opened.

It was believed that the symptoms pointed to disease of both labyrinths, the result, perhaps, of some obscure intracranial disease. An unfavorable prognosis was given, and the patient was placed upon a mixture containing iodide of potassium, bromide of potassium, bromide of ammonium, and sesquicarbonate of ammonia. Mercurial inunction was also used, and was carried to the point of slightly touching his gums. He was afterward treated with increasing doses of nitrate of strychnia, administered hypodermically, and by large doses of quinine. Electricity was applied to his Eustachian tubes and external auditory canals, both constant and interrupted currents, but all without appreciable effects.

On January 4, 1875, I tested his hearing with my watch and was surprised to find that he could hear it with his right ear at a distance of six inches ( $\frac{6}{80}$ ), and with his left at eight inches ( $\frac{8}{80}$ ). I repeated this test at different visits afterward, and found that his power of hearing the ticking of my watch varied, the farthest



point at which he heard it any time being fifteen inches ( $\frac{15}{16}$ ). The test of his power to hear the watch was repeated and confirmed by Dr. Agnew.

We saw Mr. R. again more than a year afterward (March 15, 1876). He said that in about a month after the date of his last visit the subjective noises almost entirely disappeared, and that since that time he has been free from tinnitus, except during mental excitement, when he hears one, two, or three sounds like the blows of a hammer. The stronger the excitement the longer these sounds continue. He hears the watch pressed against the right ear, and at a distance of two inches from the left ear. He hears the sound of his own voice and controls it better than when I first saw him. He says he has had much domestic trouble since he stopped treatment, and has used tea, coffee, and beer freely, and to this he attributes his not hearing the watch so well as formerly. We placed him near a piano, with his eyes closed, and struck all the keys in succession. He heard a sound when *a* and *d* in the highest octave, *f* in the lowest octave, and *f* in the next to the lowest octave were struck, but not every time. He counted correctly every time the strokes on a tumbler with the back of a jack-knife blade, with his back turned, at a distance of twenty feet.

Mr. R. states that he had a fall on his head during the fire at the Fifth Avenue Theatre, about a year before his ear trouble set in, but he does not think that was the cause of it. His residence was in a malarious district, but he thinks his deafness may be more directly due to his long and arduous labors in a new and damp painting-room, where he frequently spent fifty hours without intermission.

This patient never had venereal disease of any kind. It will be noticed that he at no time suffered from vomiting or from vertigo. It seems extremely improbable that the disease began in his ear drums. An attack of otitis media so sudden as this, and severe enough to produce such damaging results, could scarcely occur without pain, more or less severe, and this patient never had an earache, and not even well-marked headache, his main symptom, aside from deafness and tinnitus, being intense nervous irritability. Moreover, his drum-heads were normal, on inspection, when we first saw him, nearly six months after the disease was ushered in. There can be little, if any, doubt, then,

that it was an affection of both internal ears. Perhaps we may be permitted to go a step further, and venture to express an opinion as to the character of this affection. All the symptoms in the case would be accounted for by the hypothesis of a simultaneous hemorrhage, or a simultaneous exudation, occurring in both labyrinths. Reported cases of hemorrhage into both labyrinths have usually, if not always, been the results of traumatism, as falls or blows upon the head. But we see no reason why apoplexies may not occur in both labyrinths as well as in both retinae simultaneously, and we do occasionally meet with cases of the latter without any assignable cause save changes in the walls of the blood-vessels. But in the case reported above, the theory of a labyrinthine exudation seems to me the more probable one. Mr. R. seems to have been surrounded by the most favorable circumstances for "taking cold." May he not have "caught cold" in that "new and damp painting-room where he frequently spent fifty hours without intermission"; and may not that "cold," which in one man would have produced a pneumonia, and in another an otitis media, have produced in Mr. R. an inflammation of his auditory nerves, or an "otitis labyrinthica" of both sides?

The fact that the patient could hear the watch readily at a distance of several inches while totally deaf to conversation is very remarkable, and we can only explain it by supposing that the exudations which occurred in both labyrinths were plastic rather than serous, and produced pressure upon certain areas of the terminal fibres of the auditory nerve, while other portions were left comparatively free from pressure.

CASE 2.—*Wound of the membrana tympani by an oak stub.*

Dec. 21, 1875. C., æt 36, stated that four days ago, while out hunting, in the act of mounting a fence, he fell and thrust an oak stub into his right ear. Slight bleeding occurred, with immediate deafness. A bloody discharge soon occurred, with deep pain in and around the injured ear. The hearing distance is now: watch, right ear, 8 inches; left ear, 16 inches. The tuning-fork placed on the forehead is heard more distinctly in the right ear.

Inspection shows an opening through the membrana tympani below the end of the handle of the malleus.

Some pieces of bark and dirt were washed out of the ear by syringing with warm water. The middle ear was gently inflated three times a week by Politzer's method, and in the course of three weeks the perforation healed with little or no impairment of hearing.

*CASE 3.—Double rupture of the membrana tympani from a blow.*

*Jan. 27, 1875.* Mrs. N. H., æt 37, says that four days ago she received a blow of an open hand on her left ear. A noise like the roaring of the sea came on immediately, and has continued ever since, but is gradually growing less distinct. She has had absolutely no pain in the ear since that passed away which was the immediate effect of the blow, and she has not noticed any deafness. There has been no discharge from the ear. Her hearing for the watch was found to be acute and equal in both ears, nor was there any difference in the ears by the tuning-fork test.

Upon looking into the injured ear we found that there were two ruptures of the drum-head distinctly visible. One was situated in front of the handle of the malleus, was nearly parallel with it, and extended about two thirds of its length. The other extended from the end of the handle horizontally backward nearly to the periphery of the membrane. The air passed through both these openings readily when the ears were inflated by Valsalva's method. The drum-head was reddened and slightly swollen.

The patient was treated on the expectant plan, nothing being applied except, on one or two occasions, the warm aural douche to allay irritation, and the ruptures healed in the course of a fortnight, leaving almost invisible cicatrices. When the patient was last seen the hearing was unimpaired and the roaring had entirely passed away.

*CASE 4.—Supposed foreign body in the tympanum.*

*August 5, 1874.* C. G., æt. 3, came to his mother five days ago and asked for a pin, saying he had got a stone in his ear which caused pain. There was some dirt seen in the meatus. His father passed a darning-needle and "sounded" the external auditory canal and "struck something." The child was then taken to the office of Dr. D., who syringed the ear with warm water and got out some earthy matter, after which he introduced a blunt probe and felt a substance low down in the canal, filling the cavity so that he

could not pass the probe beyond it. It sounded "gritty." He then placed the child under ether and tried to pry it out. He did get hold of it, but could not pull it out with his forceps. The child was then taken to Dr. E., who probed the ear, used the ear-spoon and ear-forceps without extracting the foreign body. Yesterday morning he gave an anæsthetic and broke away a piece of bone, but still failed to remove the foreign body. Some paresis of the seventh nerve occurred early in the manipulations. Examination now shows what seems to be a foreign body pushed through the membrana tympani and stuck immovably in the middle ear.

We syringed the ear freely and then advised to desist from further active interference as a choice of evils, believing that we could not remove the supposed foreign body by any means that we were willing to employ, and hoping that at a later stage the discharges might dislodge it. Indeed, the parts were so altered by the lacerations occasioned by the attempts to remove the supposed foreign body that we could not say positively that any existed in the middle ear, but feared that the bony wall of the middle ear had been so denuded and broken as to beget the appearance of a foreign body.

In this connection it may be well for us to say what we believe to be the proper line of treatment to be pursued in such cases. When a foreign body is lodged in the external auditory canal the first means to resort to for its removal is syringing with warm water. We should use for this purpose a syringe having a large barrel and small nozzle, and endeavor to throw the stream of water not against the foreign body but the wall of the canal, so as to press past the foreign body and thus to discharge it by the recoil of the water.

If syringing does not discharge the foreign body the patient should be put profoundly under ether and very careful attempts made by the use of instruments to accomplish the object. A very thin steel scoop, or the Daviel spoon, is the best instrument for the purpose, and this should be gently insinuated between the foreign body and the wall of the meatus, while the body is held by a hook, like the cystotome used in cataract extraction, from pressing inward against the drum-membrane.

If bleeding occurs time must be allowed for it to cease, otherwise the proper direction of instruments cannot be preserved.

It is possible, also, to pass a delicate sickle-shaped knife down through the skin of the meatus, past the foreign body, and use it as a vectis after its point shall have been passed beyond the foreign body, care being exercised not to push the body deeper into the canal. No one, however, should attempt such operations unless he is familiar with the anatomy of the parts, and understands the methods of examining the ear sufficiently well to *see the foreign body* he is attempting to extract.

In practice, the syringe is usually effective unless meddling and clumsy interference has pushed the body down upon, or through, the membrana tympani.

Forceps are not available. When the foreign body fills the canal they cannot be applied, and in all cases where they can be applied the syringe will do the work, and with less danger to the organ.

In all cases the greatest care must be exercised not to press the foreign body deeper into the canal, and not to attempt to dislodge it with any instrument that does not pass between it and the wall of the canal.

No harm can be done by passing an instrument through the skin of the meatus, provided the operator really knows the depth of the canal and, by the exercise of the "learned touch," can tell when the distal end of his instrument has gone beyond the foreign body.

Cases 2 and 3 are given, not because they exhibit any striking novelty, but because their histories seem to prove that the best results in practice are often reached by the absence of what is called, and very properly, *active interference*.

ON THE OCCURRENCE AND THE SIGNIFICANCE OF  
COCCOBACTERIA IN PURULENT OTORRHOEA, WITH  
REMARKS ON THE TREATMENT OF CASES IN  
WHICH THEY ARE PRESENT.\*

BY DR. B. LOEWENBERG, PARIS.

Translated by JAMES A. SPALDING, M.D., Portland, Maine.

PART II.

PATHOLOGY.

THE external auditory meatus, amongst all the cavities of the human body, is the most suitable camping-ground for those micro-organisms which are incessantly blown to and fro by the constant currents of air about us. To these minute corpuscles its orifice must seem an immensely wide opening. When they once touch the sticky walls of the meatus they cling very firmly, gradually collect in its blind and pouch-like cavity, and usually remain for a long time entirely undisturbed, simply because the deeper portions of the meatus are exceedingly sensitive to all attempts at cleansing.

*If now a fluid secreted in the tympanum during an attack of acute otitis media is effused into the meatus through a rupture in the Mt, it becomes at once exposed to all those influences which favor putrid decomposition.* Microphytes of the most various types, or their germs, are present, the fluid stagnates, the meatus is warm; what better soil then could we have for the development of schizomycetes? Moreover,

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\* *Conclusion.*—Compare previous number of these ARCHIVES, page 220.



the serous or purulent discharge contains albuminous bodies, salts, and an abundant amount of moisture. Hence, in connection with the acid ingredients held in suspension in the air, which always has free access to the meatus, we find a perfect combination of all the materials necessary for the luxurious nourishment of these micro-parasites, as we have already demonstrated in the preceding chapter. It would be indeed astonishing if these putrefactive organisms were not developed under such favorable circumstances as these.

We must, however, insist upon the fact that these organisms are not confined exclusively to the meatus, but are pushed onward into the tympanum by syringing or by the instillation of lotions. Sometimes they fall deeper into the meatus by simple gravitation, whenever the patient lies upon the healthy side. Even the luxuriant multiplication of schizomycetes is sufficient to push the gelatinous envelope further on toward the tympanic cavity. I have seen many cases which proved beyond a doubt that cocci really pass beyond the *Mt*, for, after the most scrupulous purification of the meatus, I have once more driven air through the perforation with Politzer's bag, forced out pus, and found within it a bit of the gelatinous envelope. Moreover, I am firmly convinced that the gelatine is frequently found in the regions adjoining the tympanum. The structure of the petrous bone, with its numerous fissures and cavities, offers a superabundance of recesses in which the secretion, protected from every thing but the most careful cleansing, can stagnate undisturbed and degenerate into a perfect condition of putrefactive decomposition.

This condition of things in the middle ear is not to be regarded as an accidental and insignificant contamination by schizomycetes, but a definite *settlement* and rank development of these micro-organisms in this region. This is proved by the constant occurrence of the more highly developed and pathologically important forms of the coccus-gelatine (*Zoöglea*).<sup>1</sup>

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<sup>1</sup> This paper will refer to micrococci alone, no attention being paid to the rod-bacteria, which are by no means rarely observed.

We may take it for granted that acute inflammation of the middle ear is almost invariably followed by a much more frequent and persistent suppuration than in any other part of the body. Indeed, the fact is so common that we take it as self-evident without troubling ourselves to think of the strangeness of such an occurrence, the key to which, in my opinion, lies in the fact that here, more than in any other region of the body, all the conditions for the development of schizomycetes appear realized in a so to speak, ideal perfection. The germs of schizomycetes capable of propagating themselves are always found in the micro-organisms stored away in the meatus. Whenever they multiply under these favorable circumstances, they manifest the same influence which they always exert upon wounded surfaces, preventing recovery by first intention, causing and maintaining suppuration.

The pathological importance of these micro-parasites is, however, by no means exhausted with this account of their influence in disturbing the normal processes of repair. On the contrary, they may induce a much more critical state of affairs. When we give our chief attention to one of the most frequent complications of otitis media, *inflammation with collection of pus in the mastoid process*, it seems very plausible to assume that this condition may occur in the cavities of this bone by simple propagation of the morbid process by continuity and contiguity. In the same way we can assume as another cause, some obstacle to the escape of the secretion, such as a closure of the communication between the antrum and the tympanum by polypi, etc. Still, when we consider how often pus is found in this region in a condition of *stagnation* and putrefaction, we cannot but think that putrid decomposition of the secretion can occur in this locality and subsequently induce violent local or even general constitutional disturbances.

The same may be said of *caries and necrosis*. It is plain that the inflammation and formation of pus can extend directly from the periosteum to the bone itself, while we have an additional cause for the affection of the osseous substance proper in the development of decomposition fungi.

For we know since the publication of Klebs' <sup>1</sup> investigations into mycosis septica<sup>2</sup> that the cocci which flourish upon the granulating surfaces of old abscesses, fistulous canals, surfaces of joints, etc., can loosen the tissues and cause defects of substance. It is quite probable that the ulcerations upon the mucous membrane of the tympanum in chronic otorrhœa originate in this manner, and that the bone itself may subsequently become affected. Several causes might operate in bringing about this last condition of things which is still obscure in its finer details. If we grant that the schizomycetes cannot directly dissolve the osseous tissue, yet we may agree with Klebs that these organisms may affect this tissue by mere mechanical action, despite the fact that they cannot enter the osseous canals. I am also further inclined to think that the soluble acid substances which are formed during the development of schizophytes and the simultaneous putrefactive decomposition of albuminous bodies when plenty of air is present, are capable of dissolving at least the carbonate of lime in the bones. And,

<sup>1</sup> Edwin Klebs: Beiträge zur Pathol. Anat. der Schusswunden. Leipzig, 1872, p. 104, *et seq.*

<sup>2</sup> Great confusion seems to exist in the daily increasing literature on micro-parasites, owing to the fact that the word "mycosis" is used for the most heterogeneous things. Thus, for example, we comprehend under this title the diseases caused as well by the hyphomycetes as by the schizomycetes, and yet we know that there is a very wide difference between these two classes, as well in reference to their influence upon the organism, as to the conditions necessary for their existence, their chemical reaction, etc. Parenthetically, it may be mentioned, that by "mycosis" we also designate a body discovered by Mitscherlich in the ergot, as well as an affection of the skin, which, so far as I know, is not of a parasitic nature at all.

It seems urgently necessary in the interest of scientific exactitude that we should thoroughly sift this terminology, at least so far as concerns the diseases caused by schizophytes on the one hand, and by mucedineæ on the other, that we should divide them into two sharply defined classes and provide them with special and characteristic titles. I propose, therefore, to continue for the affections caused by mucedineæ or hyphomycetes (*aspergillus*, *penicillium*, etc.), the name mycosis, and to use for those originated by the schizophytes, the new name SCHIZOSIS (from *schizo*-mycetes).

I am convinced that in this way we shall be able to avoid all misunderstanding, which was previously a matter of great difficulty.

I would even go further and express the desire that especial titles could be created for the various groups of diseases caused by schizomycetes, *e. g.*, coccosis, bacteriosis. We might entitle those aural affections chiefly due to schizomycetes, "otoschizosis;" those due to cocci, "otococcosis," etc.

I cherish the hope that this nomenclature may be as unanimously accepted as was the title which I proposed in 1866, of "Corti's pillars." (See B. Loewenberg: "La lame spirale du limaçon et l'organe de Corti. *Journal d'Anatomie*, etc.)

moreover, we know that where osseous tissue which has resisted putrefaction for thousands of years is at last deprived of its calcareous portions, it at once yields to decomposition like all other tissues.

It is a fact that the coccus-gelatine can destroy the *periosteum*, so that the bone is laid bare and its blood supply from the outer surface cut off; in other words, necrosis can ensue. Since many chronic periosteal affections are but slightly painful, we may even see them lead to the formation of sequestra without any complaints on the part of the patient of disagreeable subjective sensations. So far as concerns the *ossicles of hearing*, I would say that they may be exfoliated in a condition which is far removed from a necrosis, for their articulating surfaces (schizomycetes can dissolve cartilage) and connective-tissue ligaments can become corroded, and disappear, so that all support is taken away and the bones drop from the meatus.

The inflammation and suppuration may advance and finally occasion *disturbances of the most serious nature in those organs which adjoin the petrous bone, as well as in those at a distance*. Thus we may observe meningitis (with or without perforation of the intervening petrous bone), phlebitis with corrosion or formation of thrombus in the adjacent sinus or internal jugular vein, or ulceration of the internal carotid, etc., all of which accidents are really to be regarded as a simple extension of the morbid process.

In contradistinction to these cases we observe others in which we find thrombi in the sinuses which are separated from the diseased bone by healthy tissues, or in which abscesses exist in portions of the brain provided with a normal cortex, or, finally, cases in which meningitis occurs only on the convexity of this nerve-centre. In such cases as these, we attempt to lift ourselves over the gap by embracing the opinion that the inflammation must have extended along the connective-tissue fibres and vessels, despite the fact that this view is evidently insupportable when we consider the normal condition of the parts which lie between the petrous bone and these organs (brain, etc.).

In opposition to this hypothesis, the proof of the occur-

rence of micrococci in purulent otorrhœa seems to offer a key to the correct significance of these complications, which are as dangerous as they fortunately are rare. We have already seen that innumerable and luxuriant cocci are present in all cases of otitis media purulenta, and *it is even more than probable that the morbid process is spread to a distance by the migration of these micro-organisms.* Inasmuch as they are absolutely incapable of self-motion (the pretended movements of cocci are simply molecular movements) they may be transferred from place to place by the agency of the *migratory cells*, into which they easily penetrate, and even into the fissures in the looser connective tissue, or into the sheaths of the blood-vessels. If this be true, we now see why they do not cause any symptoms whatever while on their pilgrimage, and only begin to act deleteriously when they meet with some impediment in the substance of the brain, where mechanical or functional causes lead to their colonization. This is the manner in which I explain the occurrence of those cerebral abscesses which show no visible connection with an existing affection of the middle ear, as well as meningitis without any connection with the inflammation of the tympanum, and so on for the other unexplained complications which have previously been mentioned. An observation by Klebs (*l. c.*, p. 110) is valuable in so far as concerns meningitis, for according to this the microspores from clumps of pus can penetrate through the tissues into the neighboring serous cavities, and even after the disappearance of all local irritative phenomena give rise to new inflammation and suppuration.

It is well known *that death occurs, during many cases of otorrhœa, under pyæmic or septicæmic symptoms*, without visible caries of the petrous bone or palpable alterations in the adjoining organs. In these cases, likewise, the mechanism by which local suppuration leads to constitutional infection is easy to understand, when we reflect upon the putrefactive processes going on in the tympanum and adjacent cavities. We prove that schizophytes penetrate the walls of the lymphatics, and even of the blood-vessels, in company with migratory cells, and we are safe in assuming that metastasis



into the lungs is caused by cocci swept into the circulation alone or in company with thrombi. Nevertheless, I am unable to say what part is taken in this process by *that toxic material which is formed during the decomposition of albuminoid corpuscles*. I would therefore recommend an examination of the blood from the living patient, in order to demonstrate the propagation of micro-organisms, and careful study of the course of the general constitutional symptoms, since poisoning by albuminous matter undoubtedly causes death more rapidly than an invasion of all the blood in the system by the parasites.

v. Troeltsch<sup>1</sup> gives an excellent description of the septic complications in purulent inflammation of the middle ear, and expresses the opinion "that the *septic gases* exude through the thin walls, which are usually composed of but a single membranous layer, and irritate the neighboring structures into a condition of putrefaction." I would like to modify this theory by suggesting that the gases do not infect the tissues, but render them more receptive to micro-organisms.<sup>2</sup>

The chief circumstance which fortifies me in the opinion that all these complications depend upon putrid decomposition is that they always occur in *old, chronic* otorrhœas, in which the development of putrefactive organisms is so wonderfully favored by the stagnation of pus in the cavities communicating with the tympanum. The fact itself is one which I discovered after carefully examining many cases recorded in literature, in which, so far as concerns the older ones, I made extensive use of the rich collection of Gintrac.<sup>3</sup> It is further remarkable how often aurists speak of the foetid odor as well as of a putrid secretion in such cases. If we do not find this mentioned in the cases communicated by

<sup>1</sup> Lehrbuch der Ohrenheilkunde, 1881, 7te Aufl.

<sup>2</sup> Compare Wernich, "Grundriss der Disinfectionslehre." I take this opportunity of yielding to this author of so many interesting papers on schizomycetes the priority in the discovery of the heating of cotton plugs for bacterioscopic cultivation, for I find by the above work, which reached me after the publication of the first part of this article, that Dr. Wernich had already resorted to this precaution for a long time. Compare also his article in *Virchow's Archiv*, Band lxxviii.

<sup>3</sup> Gintrac: Cours théorique et clinique de pathologie interne, etc. Tome viii, Paris, 1869.



non-specialists, it is a question whether they did not consider it superfluous to direct attention to this symptom of purulent otorrhœa, simply because it had come to be regarded as a matter of course.

I would say, finally, that I have as often noticed the odor characteristic of caries, although caries was not really present, as inversely. The bad odor indicates putrid decomposition, which oftentimes follows caries.

### PART III.

#### THERAPEUTICS.

With the proof that schizomycetes colonize in the meatus in purulent perforative otorrhœa, we have now a rational basis for the various plans of antiseptic treatment lately suggested in this affection. We can, moreover, advance one step further, and distinguish :

1. Fresh cases of otitis media which are as yet uncomplicated with the immigration of schizomycetes.

2. Chronic cases, already infected with these organisms, and

adopt a regular treatment for each class.

The treatment which has hitherto prevailed, in so far as concerns the influence of schizomycetes upon the middle ear, has been almost entirely *antiseptic* ; it has simply aimed to destroy the putrefactive condition already present. But for myself I lay great stress in fresh cases on the *aseptic* treatment, *i. e.*, to prevent the immigration of schizophytes, and to stop the putrid decomposition of the secretion as well as the suppuration.

In the second class it is necessary, in addition to antiseptis (which is even nowadays left too much out of account), to follow out the therapeutical indications necessitated by the structure of the affected parts, their physiological peculiarities, and, above all, by their pathological alterations.

#### I.—*Treatment of Fresh Cases.*

##### *Asepsis.*

The aim of Lister's method is to prevent schizophytes

from invading the surfaces of wounds after injuries, ulcerations, etc. If we succeed in this we obtain asepsis, so that the chances for recovery by first intention, without suppuration, become extraordinarily favorable, as has been proved by innumerable difficult and extensive operations.

If, however, we do not seek for asepsis or attempt it too late, and if schizomycetes which are capable of propagation have already encamped upon the diseased surface, we have to undertake the much more difficult task of making them innocuous and inactive; in a word, we have to strive for antiseptis. But recent experiments have shown that we need much more powerful agents to oppose the activity of schizomycetes, if already present in the putrid secretions, than to prevent their immigration. *Antiseptis, therefore, is much more difficult to obtain than asepsis.*

*If we apply these general considerations to the special relations of inflammation of the middle ear, we find that in the vast majority of cases we do not see the patients until chronic otorrhœa is present, or, at least, until the tympanum is already connected with the meatus by a perforation in the Mt, and suppuration is well under way.<sup>1</sup>*

Instead, therefore, of being able to strive for asepsis, we are in the less favorable position of being obliged to resort to antiseptis. This task, however, with the complicated structure of the tympanum and its adjacent parts, as well as its slight accessibility in case of a small perforation (see below), is oftentimes extremely difficult, while it is infinitely easier, if we can begin at the right time, to prevent the schizomycetes from entering the meatus at all, and thus cause a rapid recovery.

In every fresh case, therefore, I would suggest the following procedure, to which I have resorted for some time with the most brilliant results: When perforation of the Mt appears unavoidable, we should at once perform paracentesis. While it is quite true that almost all aurists agree to this proposition, they only perform paracentesis in order to shorten the duration and intensity of the pain. I follow of

<sup>1</sup> I leave entirely aside the question of the possible entrance of microphytes or their spores through the Eustachian tubes, and their effect.

course the same idea, yet I aim at the additional point of making a regular linear opening, with much more favorable chances for recovery than in the case of an irregular opening made by a spontaneous perforation. Yet, further, and this is my principal motive, *I operate for the very purpose of disinfecting the tympanum.* Therefore, directly after the paracentesis, which I perform with a carbolized needle, I fill the meatus with finely pulverized boracic acid, which is not only well borne, but fulfils our purpose of warding off the immigration of schizomycetes and causing a rapid recovery.

This method is easily learned and is of so great benefit that I most heartily recommend it to the profession for use in all acute cases, in order to avoid infection of the tympanic cavity by schizomycetes.

## II.—*Treatment of Chronic Cases.*

### *Antisepsis and Additional Therapeutics.*

By "chronic" I mean all those cases in which, although the acute symptoms have ceased or have even been entirely absent, suppuration still continues, and the perforation in the *Mt* is still open. If we follow out the indications suggested by the condition of affairs in these cases, we shall have to act antiseptically; to kill the schizomycetes which are present, or to make them innocuous, or to prevent the immigration of a fresh colony, and in this way to terminate the process of decomposition which keeps alive the suppuration.

These aims are reached in many cases by Bezold's method, which owes its action to the gradual absorption of the mass of boracic acid in the meatus by the constantly secreted fluids, so that every portion of the tympanum is constantly bathed in a weak solution of this acid. If it remained in the ear undissolved it would of course exert no curative action. Furthermore, when we syringe the ear with an aqueous solution of the acid, we can drive the antiseptic to a greater depth than would be possible with a powder, unless we used immense *vis a tergo*. Even with a large perforation, I can hardly comprehend how a powder

can be blown into all the recesses of the complicated system of cavities, to say nothing of the fact that they are usually lined with a swollen mucous membrane, and more or less extensively filled with pus.

The slight solubility of boracic acid (which implies the application of weak solutions only), in connection with other reasons to be later mentioned, induced me to make additions to the method of Bezold, to whom we can hardly be thankful enough for the introduction of such satisfactory treatment into practical otology. But as I was hardly satisfied with its results in all of my chronic cases, I thought over the whole subject and at last invented a *combined method* which has given me much more favorable results in the latter class of cases than the simple method of Bezold.

The train of thought which I followed was this: Our aim in all these cases is to get thorough disinfection; we must kill these schizomycetes, we must put a limit to this process of decomposition. But beyond this, and it is this point which is just now almost *entirely overlooked*, we have a *second task to fulfil; we have to cure the diseased surfaces*.

Now this problem is by no means solved by obtaining simple antiseptics, since the pathological alterations of the parts concerned, although caused by the process of decomposition, do not cease spontaneously with the cessation of the decomposition, but demand especial treatment of their own. Therefore, the treatment which I have adopted in these chronic cases has for its double aim the disinfection by antiseptics of the secretions which cover the diseased surfaces, and, secondly, the cure of these surfaces by suitable astringents.

*Let us now consider the rules for disinfection, preceding them with a few remarks on the antiseptic cleansing which ought to be performed before any application is made to the diseased cavity.*

#### *Cleansing of the Meatus and Tympanum.*

If our treatment of suppuration of the middle ear were to consist simply in the removal of the secretion from the *meatus*, it would be quite sufficient to swab out this cavity

with tampons of cotton, which are highly recommended by many specialists. But it is plain that we cannot cleanse the tympanum or its adjacent cavities in such a manner. I cannot, therefore, give my assent to the view that this method of cleansing a suppurating middle ear is quite satisfactory.

The first step necessary toward repair is the constant removal of the stagnating and decomposing secretion. Without this we can neither disinfect the locality nor act satisfactorily upon the diseased mucous membrane. The only way in which we can obtain this effect is, in my opinion, by *frequent syringing with a large amount of fluid and a forcible stream*. It is quite evident that a cavity with so many fissures and crevices can only be cleansed from all the secretion which it contains, and as much as possible from the microbes within, by a powerful stream and long-continued syringing. Beyond this, I thus endeavor to enfeeble, as far as possible, the vitality of the micrococci which remain. We know that rest and consequent stagnation are the chief causes of putrefaction, while frequent agitation, *e. g.*, with a stream of water, interferes with this process, as is witnessed in the flushing of drains, etc. Moreover, we know how easily stagnant water decomposes, and how rarely this process occurs in running streams.

Again, a superabundance of moisture exerts a noxious influence upon the growth of schizophytes. The addition of a *slight* amount, on the contrary, increases their growth. It is therefore probable that we can in this way interpret the occasionally harmful results of slight and infrequent syringing of the ear.

Nevertheless, if we use a great amount of fluid we run the risk of making the tissues swell too much by *excessive osmotic saturation*. I am sure that the antipathy of many aurists to extensive syringing is based upon a dread of this unfortunate occurrence, which may be avoided by using anti-osmotic fluids, such as a *concentrated* solution of chloride of sodium.

*Common water always contains numerous micro-organisms*, so that in the very act of using it to cleanse a wound, we

might infect it. But inasmuch as boiling for a length of time always destroys the propagative capacity of these structures, especially in a medium so poor in organic substances as water, I always boil for an hour before using, every fluid which I employ for syringing.

*Desiccation* hinders the development of schizomycetes in the same way as excessive moisture. Would not this fact explain those rare cases in which desiccated masses of pus, etc., have remained for a long time in the tympanum and its adjacent cavities without any injurious effect, while the instillation of even a slight amount of water, as is the case with careful syringing, produces the most violent inflammatory symptoms? This phenomenon is usually ascribed to the rapid swelling of the collected masses, but it seems to me that this is due *to a renewed excitation of the decomposition which has hitherto been in a state of suspense*. So long as the schizomycetes and their spores are dry, their further development is hindered. But the addition of water causes a stormy increase in the microphytes as well as a rapid decomposition of the albuminoid corpuscles, in which train of symptoms *we are not to forget that it is the initial products of decomposition which act so noxiously*. My opinion on this point is supported by the fact that the masses removed from the meatus under such circumstances possess a noticeable putrescent odor. If we wish to avoid all possible danger in those cases in which experience teaches us that the above symptoms may appear, it is best to syringe abundantly and repeatedly with water which has been rendered antiseptic by boracic acid, alcohol, etc., by which means the putrid decomposition will be held in check.

In so far as concerns the cleansing of a suppurating ear, it is important not only to show the person entrusted with the syringe how to use it, but also to let him go through with the whole procedure in our presence. It is also important to have a proper syringe. For eighteen years, I have used syringes provided with a groove along the conical nozzle, so that the fluid runs off more easily and too strong pressure is avoided.

*The size of the perforation* is another important point in



the treatment of otorrhœa. It is self-evident that we should not be satisfied with simply treating our cases with antiseptics, or astringents and caustics in connection with cleanliness, but be sure that the remedies really reach the seat of the disease (tympanum and adjoining cavities). This is of course impossible in the case of minute perforations in Shrapnell's membrane (where they are, moreover, often concealed by granulations or polypi) or in the *Mt* itself. I think that these minute openings almost always exist in the anterior portion of the periphery, the thin cicatricial tissue which covers a larger loss of substance in this region being often perforated so minutely that we cannot see the hole, and can only recognize its existence by hearing a faint squeak when we use the air-bag or the patient blows his nose. It is well known that such cases are very hard to cure, and simply, as I think, owing to the opening being so small that we cannot treat the surfaces of the tympanum at all efficiently. It is therefore indispensably necessary for us to enlarge such perforations by a sufficiently extensive incision, in order that the syringing-water as well as the lotions may fairly reach the diseased cavity. If it is impossible to fix the situation of the perforation, *e. g.*, on account of a peculiar conformation of the walls of the meatus, we must make a free incision at some suitable place, and try to keep it open as long as possible. By following out these rules we shall hasten recovery, just as we do by enlarging fistulous openings, by making counter-punctures, etc., in other portions of the body.

At the same time we must force *air* freely through the tubes and tympanum, not only in order to blow out the secretion, but to fulfil still another important indication. Stagnation in the air leads to putrid decomposition just the same as stagnation in water.<sup>1</sup> Frequent renewal and agitation of the air hinder decomposition. The insufflation of chloroform vapor, which is likewise an antiseptic agent, might increase this action in a high degree.

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<sup>1</sup> Compare the conclusions of the Moscow Surgical Society, "*Méthode d'aération : traitement rationnel des plaies*," 1877.

*Treatment of the Diseased Surface.*

If we could only treat every case of acute otitis media before perforation of the *Mt*, or at least directly after it occurred, we should undoubtedly obtain a perfect recovery in a very brief time by the above-mentioned antiseptic treatment. The only exceptional cases would be those dependent upon some severe constitutional affection such as tuberculosis, typhus, diphtheritis, etc. On the other hand, the percentage of disturbances of hearing after the acute exanthemata would be reduced to a minimum. Nevertheless, it cannot be too earnestly insisted upon that, as things now stand, the specialist rarely sees cases of this nature until the favorable moment has long since passed, either because the aural affection was overlooked in the presence of the severe constitutional disease, or because it was left to get well of itself.

In a vast majority of cases, therefore, the diseased surface is already infected with putrid organisms, so that we must at once begin with the antiseptic treatment. But even then we have not done all.

In addition to the decomposition of the pus we generally find extensive alterations in the lining of the tympanic walls as well as of the ossicles and the neighboring cavities. The deeper tissues also are often affected. The mucous membrane is swollen, infiltrated, or hyperplastic; its epithelial layer has been lost; while ulcerations or granulations are frequently noticed upon its surface.

While we may style the antiseptic treatment a defensive and, as it were, a preventive method, the anatomical conditions just described, as well as the functional disturbance, require, if we may so style it, an offensive treatment, a positive and energetic attack.

In order to fulfil this double purpose, I add to the simple boracic acid, which is soluble with difficulty, and to its directly curative action, a substance—alcohol—which increases the antiseptic effect of the acid, and exerts a beneficial astringent action upon the diseased surfaces of the affected regions.

Although I have for years been well assured of the ex-

cellent effects of alcohol in suppurative otitis media, and regarded its energetic action upon the diseased mucous membrane as a modification of the condition of the tissues by desiccation and molecular coagulation of the albuminoid fluids, I now lay great stress upon the beneficial antiseptic action of this remedy.<sup>1</sup> In point of fact, this action has long since been resorted to in the preservation of anatomical preparations, and even of entire bodies, for the purpose of opposing decomposition in fresh tissues and cutting it short in old.

Although a liquid remedy can penetrate into all cavities and fissures, it cannot remain everywhere in permanent contact with the diseased surfaces, which is another point in treatment upon which I lay great stress. This condition, however, can be fulfilled by keeping a reserve of active material in the meatus in the shape of a pulverized remedy whose gradual solution produces a continuous action. *For this reason I resort to a combination of alcohol and boracic acid.*

Whilst boracic acid is soluble in absolute alcohol in only one part in twenty-five, I order an addition of 10 to 20 per cent. more than this vehicle can dissolve. Before using, I shake the mixture well in order to distribute the superfluous powder evenly, and then I warm a part of it (at first diluted with considerable water, then stronger and stronger) in a test-tube and pour it into the ear. In this way the boracic acid is carried along with the fluid, reaches all the surfaces, and by inclining the head toward the healthy side, it sinks by its own weight into the deepest cavities.

I will here call attention to the important point of *completely filling the meatus*, since the action on the schizophytes and the coagulatory effect upon albuminous substances manifests itself all the more forcibly, the greater the amount of active substance which comes into contact with them. Moreover, as a prolonged contact is just as important as the above point, I let the lotion remain in the ear as long as possible.

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<sup>1</sup> Thausing : *Allg. Zeitsch. für Bierbrauerei*, etc., Band vi. Anti-fermentative action of alcohol.

I find this method more suitable and more applicable than my former one of using the above remedies alternately: insufflating the pulverized boracic acid at evening and instilling the alcohol in the morning.

By using both of these methods, especially *the supersaturated alcoholic solution of boracic acid*, I have cured many a case in which boracic acid alone was of no benefit. The significance of the results thus obtained is easy to explain when we consider the inefficiency of merely antiseptic agents against the pathologico-anatomical substratum of this disease and the powerful action of alcohol in this respect.

Even granulations and polypi often disappear under this treatment without any direct operative interference. Alcohol alone also gives us the same result, as both Politzer and myself have noticed for many years.

Satisfied with the results which I have obtained by this method of treatment, I have not as yet experimented with other substances dissolved in alcohol, more especially since boracic acid is the least irritating of all antiseptics, as is proved by the fact that it can even be used on mucous membranes in a condition of acute inflammation.

After successfully using this method, or the simple boracic-acid treatment, I noticed in some cases that, despite the disappearance of every symptom of putrefaction (disagreeable odor, etc.), and an advance toward recovery, *the microscope still revealed occasional clumps of cocci*. I will mention, by the way, that Klebs (*l. c.*, page 107) "rarely failed to find his microsporon septicum in laudable pus." Moreover, schizomycetes which are still capable of propagation are often found under Lister's antiseptic bandage even when thoroughly and successfully applied. I willingly confess that I cannot explain these facts, which seem to oppose the modern theory of the recuperation of wounds, and I can only say that we cannot as yet correctly explain these phenomena. When other authors try to support their views by declaring that such micro-organisms are "incapable of invasion," I cannot but regard it as a most unsatisfactory method of begging the question. Billroth's opinion<sup>1</sup> that

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<sup>1</sup> Billroth, *Allg. Chirurg. Pathol.*, 9 Aufl., page 183, Berlin, 1880.

those micrococci only are inflammatory "which originate in certain inflammatory products, in decomposing pus, urine, etc., and there receive the fermentative principle" is much more precise.

Besides using alcohol and boracic acid in combination, I have employed other antiseptics and astringents, *e. g.*, the *insufflation of a mixture of pulverized boracic acid and alum*. Still, I have not as yet had sufficient experience with this method to be able to define its precise value. Nevertheless, I will here emphasize the following point, which is to be borne in mind in using alum in any combination: it is well known that hyphomycetes (*aspergillus penicilium*, etc.) are frequently observed in solutions of alum and other substances, as I long ago noticed and recognized as a cause of otomycosis.<sup>1</sup> The facility with which these parasites make their appearance in solutions of alum especially, lies, in my opinion, not so much in the chemical nature of the substance in solution, as in the contamination of the finely pulverized and carelessly guarded or manipulated alum with dust, to say nothing of all sorts of spores or germs. I have, however, tried to deaden their effect by applying great heat to the powder before dissolving it, and afterward by boiling the solution.

These contaminations are often of a coarse and macroscopic nature. Thus, I noticed most extraordinary inflammatory symptoms in the *Mt* of one patient after the first insufflation of the mixed powder of alum and boracic acid. On syringing the ear, large clumps were removed, which even by weak powers showed a variety of mineral and vegetable contaminating substances. Among them there was found even a particle, visible to the naked eye, which under the microscope was recognized (by the dots) as pine-wood. It is therefore necessary to examine the ordinary alum powder (and perhaps, also, other powders) for contaminations, for we must be sure of the purity of a remedy if we desire correctly to know its effect.

I am inclined to believe that the furuncles observed by other aurists after instillation of alum solutions did not re-

<sup>1</sup> On fungous ear-disease. Cork Congress, 1879. *Les champignons parasites de l'oreille humaine*. Congrès de l'Assoc. Française, Reims, 1880, and *Gazette Hebdomadaire*, 1880.

sult from the chemical effect of the liquid, but from the micrococci introduced with the powder.

In conclusion I would recommend that the powdered boracic acid be preserved in well-closed bottles, in order to prevent contamination from dust.



## NECROSIS AND ELIMINATION OF ALMOST THE WHOLE BONY APPARATUS OF HEARING IN AN ALMOST COMPLETE FORM.—RECOVERY.

By DR. S. POLLAK, St. Louis, Mo.

IT does not often happen, when all the tissues of the auditory apparatus are destroyed by disease, that the affected parts are cast off by nature's own efforts, with complete restoration to health and only a loss of hearing.

It is well known that suppurative inflammation of the middle ear is often destructive in its results, not only to hearing, but sometimes even to life, if neglected or improperly treated. But such is the recuperative power of youth or childhood, that even the cranial cavity may be invaded, the vaso-motor system encroached upon, nerves and blood-vessels lacerated or severed, alimentation and nutrition impaired, mental and physical repose rendered impossible, and nevertheless such patients will sometimes recover without medical aid, and perhaps in spite of it.

The following case, which was brought to my *clinic at the Eye and Ear Infirmary* of the *St. Louis Hospital*, is a typical illustration of the above.

A girl, aged five years, of very healthy parents, and living in a very healthy part of the city, was suffering from profuse fetid otorrhœa from the *left* auditory canal; pus was also flowing from a wide opening in the mastoid process and from an opening on the posterior surface of the auricle, which was bent over into an obtuse angle by a pus-pouch. The whole left side of the face was tumefied and paralyzed. The eyelids remained *unimpaired*, both in form and function.

The disease began *three years ago* with a suppurative adenitis of the submaxillary gland of the *right* side, which was treated with cataplasms. In due time the abscess was lanced, allowing the escape of a large quantity of fetid pus, which continued to flow for several weeks, but had gradually subsided, and at last ceased altogether of its own accord. Soon afterward ear trouble on the *left side* began, and has continued ever since.

The cardinal symptoms were excruciating pain and fever, which did not abate until otorrhœa set in. This was most likely an *otitis media suppurativa*, resulting in a rupture of the membrana tympani. The physician in charge declared: "The flow cannot be stayed until the ossicles are cast off." So nothing was done for nearly a whole year. Another medicus was then consulted, who said: "The ear is full of polypi, but which cannot be removed until the girl has completed her seventh year." Thus the child was doomed to suffering, until brought to this clinic.

She presented a woful appearance, and was in the highest degree prostrated. She was feverish and without appetite; alvine discharges irregular; she was sleepless from pain, and so nervous that a mere look would set her screaming.

She had to be etherized before an accurate examination could be attempted, in which I was kindly assisted by a large class of medical students and some old practitioners of medicine.

I found through the opening in the mastoid process a piece of necrosed bone projecting, which on being tugged at, was perceived to be the outcropping portion of a long and large sequestrum. Seizing it with a pair of forceps, and making gentle traction, it broke off. This was a part of the *mastoid process and cells*, illustrated by figure 1 in double the natural size.



FIG. 1.

Dipping down again, I seized the remaining fragment and lifted it out with all ease; it proved to be the *entire petrous portion of the temporal bone* (figs. 2 and 3;  $\frac{2}{3}$ ), and thus the cranial cavity has



FIG. 2, the anterior



FIG. 3, the posterior

surface of the petrous bone. In the centre of fig. 2 is the promontory and oval window; in fig. 3, at the junction of the right and middle thirds, the meatus audit. int.; at the junction of the middle and left (lateral) thirds are the posterior and superior semicircular canals, chiselled open.

most likely been opened. Digital exploration detected some more spiculæ, which, on being withdrawn, proved to be the *osseous portion of the external auditory meatus* (fig. 4;  $\frac{2}{3}$ ).

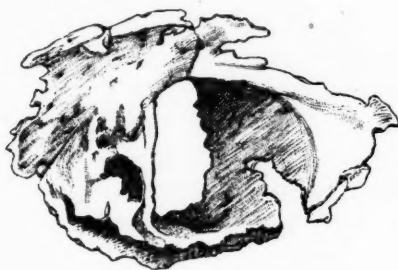


FIG. 4.

Bleeding was very profuse, both from the mastoid opening and the auditory canal. I feared a laceration of the jugular, or a rupture of the petrosal sinus of the dura mater. The hemorrhage, however, was soon arrested. Three long but small polypi were found in the meatus and twisted off. The cavity left after the removal of the sequestra felt smooth and soft, as if lined with vigorous granulations, which undoubtedly had sprung up all around the necrosed bones, and thus enucleated them. The cavity in the mastoid and the meatus were filled with absorbent cotton dipped in iodoform.

Improvement began and has progressed rapidly ever since. A profound sleep of twenty-two hours followed immediately the extraction of the sequestra, a boon denied her for so many years; a desire for food followed. One by one all the physio-

logical functions of returning health set in. She slept, she ate, she became cheerful and playful.

The tumefaction of the left side of the face subsided rapidly, but the paralysis remains, owing to the destruction of the portio dura.

The opening in the mastoid process closed within a week, and also the opening in the auricle, which finally resumed its normal position.

The flow of pus from the auditory canal grew less and less daily, and become odorless. The auditory canal is now funnel-shaped, or conical, terminating in a cul-de-sac.

The tonsils are of normal size. I presume the Eustachian tube will soon be obliterated entirely, there being no further use for it.

It is unaccountable why the motility of the orbicularis palpebrarum should remain unimpaired. She closes the lids when asleep; no trace of a lagophthalmia.

Although she is gaining in health and strength daily, still I enjoined that only moderate physical exercises be allowed. The exposure, or rather the want of due support to the cranial cavity, may forebode danger, which might become serious, or even fatal, upon extraordinary exertion.

We may expect that the dura mater, as well as the periosteum, will become osseogenic, and thus fill up the chasm caused by the removal of the petrous portion of the temporal bone.

TREPHINING OF MASTOID IN A CASE OF OTITIS  
CATARRHALIS CHRONICA, WITH AN INTACT  
MEMBRANA TYMPANI. OPENING OF THE LAT-  
ERAL SINUS. RECOVERY BY FIRST INTENTION.

By H. KNAPP.

ONLY a few cases have been published in which the mastoid was opened when there was no suppuration and the membrana tympani entire. In the case here to be reported I was led to resort to this operation by constant pain which, starting from a tender mastoid, extended over the corresponding side of the head, incapacitating the young sufferer from pursuing her education. The history is as follows.

Miss Maggie B., æt. 16, of New York, has had chronic non-suppurative inflammation of both middle ears for the last seven years. Her mother had been deaf from the same cause. She (the daughter) was subject to colds in her head, and when she presented herself to me for the first time, on October 24, 1881, the mucous membrane of her naso-pharyngeal cavity was uniformly, but only moderately red and swollen. The auditory canals were of normal width, dry, covered with some scales. The *Mtt* were dull-white, not sunken, the light spots scarcely perceptible. The tubes were somewhat narrowed, but open. Her hearing,  $\frac{1}{2}$  R  $\frac{1}{2}$  ft., L  $\frac{1}{2}$  ft.;  $\nu$  L  $\frac{12}{80}$ , R  $\frac{5}{80}$ , was but little improved by Politzer's experiment. She did not come to me on account of her hardness of hearing, but on account of a constant pain, which for three months had centred in the left mastoid process, extended over the whole left side of the head, and occasionally run through the face and down the neck. It disturbed her sleep and made the slightest mental

efforts impossible. In spite of all care it had been so persistent and distressing that she had been obliged to leave school, which she did very reluctantly.

I found the skin over the left mastoid process slightly red and swollen, but very tender to the touch. The pain from pressure on the mastoid always radiated over the side of the head. The other mastoid region was normal, and could be pressed and even hammered upon without causing any discomfort.

I advised her for a week to avoid physical and mental exercise as much as possible. She did so, but returned stating that rest had not alleviated the pain in any way. I found her hearing somewhat better, but the condition of the ears, and especially the left mastoid region, unchanged.

Supposing that a chronic inflammatory process was going on in the left mastoid cells, penning up muco-purulent or sanguinolent liquid, I proposed to open the mastoid, to which she and her relatives not only consented, but urged me to do all in my power to relieve this long suffering which rendered her unfit for any thing, and depressed her spirits in an alarming degree.

On November 3, 1881, in the operating-room of the New York Ophthalmic and Aural Institute, and before the students, I performed the operation in the following way. The patient being fully etherized, I made a vertical incision three *cm.* in length, one *cm.* behind the insertion of the left auricle. The periosteum was not thickened, and the surface of the bone was white and smooth. The periosteum was scraped off from the bone with a raspatory the whole length of the wound to the breadth of two *cm* in the middle. As in this whole region both the periosteum and the bone had proved perfectly normal, I at once concluded to chisel the mastoid process open. This was done with a very sharp chisel of good steel, the cutting edge of which was 5 *mm.* long. I have found this kind of chisel the most reliable and efficient in the removal of bony growths, some of which, by their ivory hardness, resist almost all other instruments. By steady and gentle hammering I chiselled a vertical elliptical groove of two *cm* in length, and 1.5 *cm* in breadth into the bone. The surface of the groove was perfectly clean, the pieces of bone coming off like the chips from a piece of hard wood. The edge of the chisel was mostly directed downward, but at times also upward, in order to keep the chiselled surface smooth and like a nicely carved navicular fossa.

The bone in its outer layers, to the depth of about 4 *mm.*, was



white and shining like its surface ; in its inner layers, however, it was markedly hyperæmic, requiring frequent wiping away of the blood. The bone substance was compact in the whole depth of the wound. When the fossa was 6 *mm* deep, the probe discovered soft tissue which, on gentle pressure, let dark blood flow out in an uninterrupted stream. Cessation of the pressure stopped the hemorrhage at once. Further cautious soundings, in order to explore the cavity, always had the same result,—an abundant welling out of dark blood, in which an admixture of muco-pus, though looked for, could not be clearly recognized. As the quantity of blood thus escaped was greater than the cavity of the mastoid could hold, I felt satisfied that the blood was derived from the lateral sinus, into which either the chisel or the probe had made a small opening. The blood flowing only when the soft tissue at the centre of the wound was pressed upon, I feared no after-hemorrhage, cut away any shreds of periosteum that could have been bruised during the operation, wiped the wound carefully with a sponge, and closed it by five interrupted sutures of fine silk passed through skin and periosteum. A thin and short perforated silver tube was placed into the lower corner of the wound, and the whole region covered with a pad of absorbent cotton, held in position by a flannel roller and exerting, by its elasticity, a gentle but constant pressure. The wound, in this way, was treated as an ordinary phlebotomy, and healed also in the same way without suppuration, in fact without any irritation.

The whole operation had neither been laborious nor tedious. The timid patient had inhaled a considerable quantity of ether, and was very noisy and restless for an hour or two afterward. She then fell asleep, and passed a quiet night.

The *next* morning she felt well, had no fever, complained of soreness in the region of the wound, but said that her old headache had left her.

On the *third* day the bandage was removed, the cotton was dry, no oozing even from the silver tube. The anterior lip of the wound was slightly reddened and swollen.

On the *fourth* day there was a drop or two of puriform moisture on the tube. The tube therefore was removed, and as on pressure no secretion whatever was liberated, and the place where the tube had lain showed a clean fleshy surface, as, moreover, the whole region of the wound was scarcely swollen and not tender to the touch, I left the bandage off altogether in the expectation

that the lower open edge of the wound would scab over, which it did in a few hours.

Two days later the sutures were removed.

The patient was kept in bed for a week, then allowed to be up only an hour or two a day. Twelve days after the operation she was discharged from the Institute, with strict injunctions not to leave her room for another week, and stay in bed the greater part of the day. She followed my instructions faithfully. From the day of the operation to this date, December 12th, thirty-nine days later, she has been free from fever. The integument over the wound was only very slightly swollen, and now shows a linear cicatrix. Neither the membrana tympani nor the adjacent parts of the ear canal ever exhibited any symptoms of inflammation, and the patient's acuteness of hearing is now more than doubled. This is, however, not wholly to be ascribed to the operation, for the hearing in the other ear improved also, though not so much. The previous distressing headache has not reappeared. During the last week she felt quite comfortable, and thinks now to be able to return to her school.

*Remarks.*—The morbid process in our patient may be considered as a *chronic mastoiditis interna leading to sclerosis*. This condition is well enough known and described, and I have seen several specimens of such bones freshly removed from the cadaver. The hyperæmia of the sclerosing bone substance is very characteristic, and strikingly contrasting with the ivory-like cortex of the mastoid.

The constant pain located in the mastoid process, and irradiating over the corresponding half of the head, occasionally also over the face and neck, is the principal symptom of mastoiditis interna, and frequently met with in acute catarrhal or purulent inflammation of the middle ear. The opening of the bone in *acute* mastoiditis commonly shows speedy and favorable recoveries, and those who are accustomed to operate under such circumstances can certainly record brilliant cures; they only should not forget that the vast majority of these cases get well without an operation, when rest in bed and rigorous hygienic deportment are enforced. I could support this proposition by many an example from my own practice. Yet when the symptoms are alarming, and when in spite of strict treat-

ment the headache does not abate, I think the opening of the mastoid indicated. The division of the periosteum (Wilde's incision) is of very little value. The beneficial effects noticed in many instances after this little operation, are, I think, chiefly brought about by the rest and rigorous treatment to which the patients then more readily submit. External periostitis, a much rarer disease than internal periostitis of the mastoid, does not show the intense widespread headache, but rather a local pain, and is indeed greatly benefited by division of the periosteum. If the diagnosis be doubtful the integrity of the periosteum and of the outer surface of the bone may, as has of late been very cogently stated by Dr. F. C. Hotz, of Chicago,<sup>1</sup> determine the surgeon to let the division of the periosteum be immediately followed by the trephining of the bone. The above-described case is a good illustration of this proposition.

I do not know whether the mastoid intentionally has ever been opened for sclerosing inflammation. That it can be done with safety and benefit is demonstrated by our case. The indication would chiefly lie in the persistent pain, centering in the mastoid and thence irradiating over the head. The case which comes nearest to ours, so far as I have perused the incident literature, is the xlvii<sup>th</sup> of Schwartze's series, in the *Arch. f. Ohr.*, xiii, p. 249.

The accidental opening of the lateral sinus in some cases was, as in ours, not followed by any consequences; in others it has proved fatal. Whenever it occurs, I would, after careful cleansing, at once hermetically close the wound, and let the patient lie in bed as immovably as after a cataract extraction, for healing without suppuration is in the one instance as essential as in the other. Carbolic acid spray and specifically antiseptic substances are, in my opinion, not only superfluous, but may do harm, in so far as by their chemical action on the tissues they are much more apt to favor than to prevent suppuration. The well-known conditions for obtaining union by first intention are: incised and not contused wounds, perfect cleanliness in all manipula-

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<sup>1</sup> These ARCHIVES, vol. ix, p. 156.

tions, removal from the wound of all foreign bodies including shreds of bruised tissue, sawdust, or small particles of bone and blood in more than minimal quantities; furthermore, perfect and, if possible, hermetical closure of the wound, immobility of the parts concerned, and rest of the body.

In the above case no specifically antiseptic substance or method was resorted to. The recovery could not have been smoother under any kind of treatment. One example, of course, does not prove any thing, but I may here state it as my personal experience, that such recoveries, under like circumstances, are the rule from which there are only few exceptions.

In concluding the remarks on our case I cannot omit to mention that some doubt may be entertained as to whether the lateral sinus was really opened, or whether the blood came from the cavity of the mastoid process, the communication of which with the tympanum having been obliterated by the chronic catarrhal inflammation. "In such a case," says Urbantschitsch,<sup>1</sup> "the air is gradually absorbed and replaced by a bloody-serous fluid." It was on the supposition of the presence of such a closed cavity that the operation was undertaken, and bolder probing or more extensive chiselling might, perhaps, have verified the supposition, yet the hemorrhage at each pressure was so abundant and steady, and the blood so uniformly dark red, that I believed it to come from the lateral sinus. Even if I had felt less convinced of this condition, I would have given the patient the benefit of the doubt, abstained from risky explorations, and treated the wound as a phlebotomy.

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<sup>1</sup> Text-book, p. 445.

**On Epidemic Cerebro-Spinal Meningitis and the Subsequent Combined Disturbances of Hearing and Equilibrium.** By Dr. Moos, Professor of Otology at Heidelberg University. Large 8vo, 68 pages. Heidelberg: Carl Winter, Publisher, 1881.

Reviewed by Dr. OSCAR WOLF, of Frankfort-on-the-Main.

(Translated by James A. Spalding, M.D., Portland, Me.)

Moos has worthily celebrated the twenty-fifth anniversary of his graduation in medicine, by dedicating the monograph now lying before us to his faithful friend and colleague, Dr. H. Knapp, of New York. It would be "carrying coals to Newcastle" were we to mention in these pages the deserved renown which both of these skilful men have gained in the development and extension of scientific otology. We will, therefore, content ourselves with joining heartily in the wish of the author, "that kind fortune may continue to favor the mutual labors of both men."

The book itself, the material for which Dr. Moos has been collecting with his well-known conscientiousness for more than eighteen years, embraces in a critical review the various literary notices upon this subject that have hitherto been published, while by the addition of much that is new and interesting, in so far as concerns the combined disturbances of hearing and equilibrium, it offers a finished picture of our knowledge in this difficult and much-disputed field. Therefore, the little book will be welcome, not only to the specialists, but to all who are interested in the study of the physiology and pathology of the central nervous system.

In so far as concerns the *etiology* and *morbidity* of epidemic cerebro-spinal meningitis, Moos makes use of his sixty-four cases to demonstrate that most of them were seen between 1865 and 1871, and that sporadic cases still occur in those districts of Germany in which an epidemic formerly raged. He thinks that the affection is noticed more frequently in the winter and spring. The

age and sex of the patients are also briefly registered. Moos adopts Ziemssen's division into four forms, but warns us not to diagnose an independent labyrinthine affection, in the so-called abortive form. Finally, "the complications with other diseases, the various symptoms in the cases under observation (especially the initial symptoms), the affections of the organs of special sense, and the sequelæ," are all duly considered.

A review of the "frequency of the subsequent disturbances of hearing" shows that authors differ a great deal in their percentages of permanent disturbances, in comparison with the total number of affections observed. Thus, Moos, in his cases, found 59.3 per cent. deaf-mute, 31.4 per cent. deaf without deaf-mutism, 7.8 per cent. permanently hard of hearing, while only one patient (1.5 per cent.) escaped without any subsequent affection of hearing. Supplementary remarks are added on the "period at which the hearing becomes affected, the prognosis of restoration of hearing, and on the loss of speech."

In the chapter "on pathological anatomy," the author takes it for granted that we know what alterations take place in the brain and spinal cord in cerebro-spinal meningitis, and pays particular attention to those changes "which may be of interest in determining the functional disturbances of the organ of hearing, or in elucidating the disturbances of equilibrium."

All of these deductions must be studied in the original. We will, however, merely notice that, in explaining why the facial nerve, although lying close to the auditory nerve, is so rarely affected, Moos shows that the facial nerve is chiefly nourished by different blood-vessels, *i. e.*, by the stylomastoid and middle meningeal arteries, while the internal auditory artery, which accompanies the auditory nerve, sends only a very small twig to the facial nerve. He also considers the *labyrinthine affection*, in a majority of his cases, as due to a *neuritis descendens*; *i. e.*, as a slow encroachment of the inflammation from the interior of the cranium into the labyrinth, along the perineurial vessels of the auditory nerve.

We learn from the "analysis of the subsequent disturbances of hearing," that whoever hears the higher tones better after the disease, or hears the lower tones badly or not at all, has greater chances for improvement in his comprehension of spoken words than if the inverse is the case. If absolute deafness persists for more than three months, the prognosis is bad, without any excep-



tion. A more favorable prognosis may be made, if subjective sensations of sound re-appear during convalescence, provided that the hearing had previously been wholly lost. Moos has but little hope of success from treatment in the series of cases now under consideration. In those cases, however, in which hearing has not been absolutely destroyed, the *constant current* offers some hope for improvement.

The most important symptom of all, in a physio-pathological point of view, "the staggering gait subsequent to the disease," is next analyzed. The author regards the semicircular canals and their ampullæ as the "probable seat of the disturbances of equilibrium subsequent to cerebro-spinal meningitis," and bases this opinion upon a recapitulation of the results of experimental physiology and pathological experience. We cannot, of course, at this place, repeat the contradictory views of Moos and Baginsky, and will merely remark that we agree with Moos, as we have already done in our review of Baginsky's paper.<sup>1</sup>

The result of the monograph is summed up in *eight conclusions*, with which we can all the more readily agree, since they express only fundamental facts, and reserve for further investigation the final solution of the question of the function of the nervous apparatus in the crista of the ampullæ and the sacculi.

Finally, we must call attention to the criticism on CHARCOT's treatment of auditory vertigo. Moos acknowledges that quinine is advantageous in some cases, but he believes that it acts by antagonizing inflammation, and not, as Charcot thinks, by destroying the remnant of hearing as well as the functional activity of the auditory nerve. The histories of sixty-four cases, with remarks and notes, make a valuable conclusion to this latest work which Moos has given to the profession.

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<sup>1</sup>These ARCHIVES, vol. x, No. 3, page 281. We must, however, add that our opinion was entirely independent of that which Moos here lays down, for both papers were in the printer's hands at the same time.

ABSTRACT OF AMERICAN OTOLOGICAL LITERATURE DURING THE SECOND AND THIRD QUARTERS OF THE YEAR 1881.

BY DR. SWAN M. BURNETT, OF WASHINGTON, D. C.

Great reproductive power of the membrana tympani. A new method whereby the Eustachian tubes may be permanently opened, dilated, and treated, etc. By A. W. ADAMS. *Rocky Mountain Med. Rev.*, June-July, 1881.

A. relates three cases of long-standing and profound deafness due to dry catarrh, which were relieved by taking out a section of the *Mt* and treating the mucus membrane locally, through the opening thus made. In all of these cases he found the drum-cavity filled to a greater or less extent with dried mucus, which required considerable time to soften and remove. He reports that the *Mt* healed kindly after treatment was at an end.

Desquamative inflammation of the ear. By J. ORNE GREEN. *Boston M. & S. Journal*, July 21.

G. relates five typical cases of this affection in detail, and quotes largely from the published literature on the subject. He thinks that large collections of epidermis in the ear are of three kinds. 1. Desquamative inflammation of the meatus, membrana tympani, or tympanic mucus membrane. 2. Pearl tumor of the tympanic mucus membrane. 3. Endothelial tumor of the lymph-spaces in the drum membrane.

Fatal otitis. By G. C. HARLAN. *Phila. Med. Times*, Aug. 27.

Five cases are related in which death resulted from an extension of inflammation from the middle ear to the brain.

Two cases of perforation of the membrana tympani from *ascaris lumbricoïdes*, with remarks upon the curious habits of this human parasite. By C. S. TURNBULL. *M. & S. Rep.*, July 9, 1881.

Deafness as the result of the poison of syphilis. By LAURENCE TURNBULL. *Med. & Surg. Rep.*, Dec. 11, 1880, and Aug. 6, 1881.

Three cases are related: two of *heredito-syphilitic* disease; *no relief to hearing from treatment*, but much improved by the use of auricles; and one of keratitis parenchymatosa, *otitis media catarrh*, and *otitis interna heredito-syphilitica*; recovery. He is of the opinion that syphilitic diseases of the ear are less common in the United States than in Great Britain and Europe.

Rupture of drum-head from a box on the ear. By A. S. GORE. *Peoria Med. Monthly*, August.

The left *Mt* showed a clean, straight and almost vertical incision 3 mm. in length, the centre being behind the insertion of the manubrium. There was no hemorrhage. The wound had healed at the end of a week, and hearing power was completely restored.

Primary abscess of the mastoid process by E. GRÜNING. *Med. Record*, June 4th.

There was no history of catarrhal inflammation of the middle ear, but there were hardness of hearing, tinnitus, and stiffness of the neck, pain on pressure over the mastoid, but no swelling. Leeches and a Wilde's incision failing to give relief a perforation of the mastoid process was made, and about eight drops of pus let out. The patient was relieved of all the symptoms but a tinnitus which is still present.

Substitute membrane in the aural canal. By FRANCIS VALK. *Med. Record*, Oct. 22.

Two cases are related in which, after total destruction of the drum-membranes by suppurative processes, new membranes were formed, occupying very nearly the seat of the normal *Mt*.

Abscess of the mastoid cells from the use of the nasal douche. By A. M. ROSEBURGH. *Canada Lancet*, vol. vi, p. 206.

Death from the use of the nasal douche. By R. W. TAYLOR. *Med. Herald*, October.

The patient was a man 55 years of age, afflicted with nasopharyngeal catarrh. After the use of a nasal douche he was affected with an acute inflammation of the middle ear, which in the course of a few days was followed by severe chill and alarming head symptoms, offering all the characteristics of cerebral meningitis. He died 53 hours after the initial chill. No autopsy.

Dental sound-transmission. The Japanese otacoustic fan. By SAMUEL SEXTON. *Med. Record*, Sept. 10th.

S. has contrived a sound transmitter which can be attached to Japanese or other fans, and removed and carried in the pocket when not in use. It consists of a German-silver plate folded together but leaving space enough to receive the edge of the fan between its free edges. The mouth-piece of the transmitter is slightly turned up, thus affording a better adaptation to the teeth than the edge of the fan. While not as good as the ear-trumpet, S. thinks the otacoustic fan possesses the advantage of inconspicuousness.

Nasal stenosis. J. O. ROE. *Trans. Med. Soc. of State of N. Y.*, 1881.

R. devotes a section of his paper to the influence of nasal obstructions on the apparatus of hearing. The effects produced by this obstruction may be merely functional, but are likely to lead, sooner or later, to structural changes, both in the drum-cavity and the Eustachian tube. The methods of dealing with these nasal obstructions are considered in full.

## REPORT ON THE PROGRESS OF OTOTOLOGY FOR THE FIRST HALF OF THE YEAR 1881.

Translated by R. C. BRANDEIS, M.D., of New York.

### III.—PATHOLOGY AND THERAPEUTICS OF THE ORGAN OF HEARING.

By A. HARTMANN, OF BERLIN.

#### GENERAL.

1. HESSLER. Statistical report of the cases examined and treated in the polyclinic at Halle a. S., from Oct. 15, 1879 to Oct. 15, 1880. *Arch. f. Ohrenheilk.*, vol. xvii, p. 40.
2. A. MARIAN, Aussig. Report of the cases of diseases of the ear, treated from Oct., 1878 to Oct., 1880. *Ibidem*, p. 48.
3. K. BÜRKNER, Göttingen. Report of the cases treated in my polyclinic for the diseases of the ear in 1880. *Ibid.*, p. 187.
4. HEDINGER, Stuttgart. Report of the Institute for Diseases of the Ear in Stuttgart, from 1877 to 1879, etc. Stuttgart, 1880.
5. Eleventh annual report of the N. Y. Ophthalmic and Aural Institute, New York, 1881.
6. First annual report of the Newark Ophthalmic and Aural Hospital. Newark, 1880.
7. J. HEBERMANN. Comprehensive report of the otological clinic of Prof. Zaufal for the year 1879. *Archiv f. Ohrenheilk.*, vol. xvii, p. 24.
8. ROBERT SINCLAIR, Dundee. Epitome of a paper on the nature and relations of diseases of the ear. *Lancet*, Feb. 5 and 12, 1881.
9. K. BÜRKNER, Göttingen. Diseases of the ear in railway employes. *Archiv f. Ohrenheilk.*, vol. xvii, p. 8.

10. J. GOTTSTEIN, Breslau. Contributions on the diseases of the ear occurring during the course of the acute exanthemata. *Archiv f. Ohrenheilk.*, vol. xvii, p. 16.

11. ORNE GREEN. Clinical observations. *Amer. Journ. of Otol.*, vol. iii, p. 135.

12. J. GRUBER, Vienna. On the open mouth of the deaf. *Monats. f. Ohrenheilk.*, No. 5, 1881.

13. J. GRUBER, Vienna. On the condensation and rarefaction of air in the external auditory meatus as a therapeutic agent in the treatment of diseases of the ear. *Wien. Med. Zeitschr.*, Nos. 1 and 2, 1881.

14. E. ZAUFAL. Disinfecting capsules in connection with the ordinary air douche. *Archiv f. Ohrenheilk.*, vol. xvii, p. 1.

15. CRESSWELL BABER, Brighton. Note on the tuning-fork in the diagnosis of diseases of the ear. *Lancet*, April, 1881.

16. A. POLITZER, Vienna. A small instrument for the deaf. *Wien. Med. Wochenschr.*, No. 18, 1881.

17. J. GRÜNFELD, Vienna. A demonstrating mirror attached to the aural speculum. *Mon. f. Ohrenheilk.*, No. 4, 1881.

18. O. D. POMEROY. A modification of the aural and laryngeal reflector. *Amer. Journ. of Otol.*, vol. iii, p. 35.

19. E. TREIBEL, Berlin. The second international congress of teachers of the deaf-mute, in Milan. Published by W. Issleib, 1881.

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7. In HABERMANN's report of Zaufal's clinic the house and dispensary patients are tabulated separately. The tabulation is so complicated that we were unable to incorporate the report in the following table. 971 patients were examined.

8. SINCLAIR endeavors to prove that general therapeutic laws should be applied to the treatment of diseases of the ear; and treats especially of diseases of the middle ear, the removal of their causes, rest and quiet, derivation per alimentary canal, local depletion, and where there is a collection of mucus, paracentesis of the drum-membrane.

9. BÜRKNER has published the result of his examination of 24 railway employes who came to him for treatment. In the locomotive engineers, as well as in the brakemen, bone conduction was impaired, and, as a rule, although hearing of the voice was but slightly dulled, high tones were perceived but rarely, if at all.



Bürkner is of the opinion that these phenomena are due, in part at least, to changes in the labyrinth. He accepts the conclusions arrived at by Moos in great part, and would favor an examination of the switch-tenders and porters as well as of the engineers and firemen.

1-6. The statistical reports are compiled in the following table :

	HESSLER.	MARIAN.	BURKNER.	HEDINGER.	KNAPP.	KIPP.
DISEASES OF THE EXTERNAL EAR.						
Perichondritis . . . . .	—	—	1	2	4	2
Eczema . . . . .	11	9	12	25	23	43
Malformations . . . . .	—	—	—	7	—	—
Otit. externa circumscr. (furuncles) . . . . .	25	15	13	91	19	39
"    "    diffusa . . . . .	9	14	17	99	28	23
Impacted cerumen . . . . .	74	87	68	239	112	90
Otomycosis . . . . .	1	2	—	10	1	2
Foreign bodies . . . . .	9	6	2	36	5	5
Exostoses . . . . .	—	—	—	19	—	—
Myringitis . . . . .	1	10	9	29	—	1
Ruptures of membr. tympani . . . . .	2	1	3	26	1	2
Other diseases of external ear . . . . .	1	—	2	14	33	14
DISEASES OF THE MIDDLE EAR.						
Acute (includ. subacute) catarrh . . . . .	109	56	20	286	49	84
Chronic catarrh (sclerosis) . . . . .	99	159	99	1072	431	194
Acute, purulent catarrh (including subacute inflammations of the middle ear) . . . . .	68	33	24	152	12	51
Chronic purulent { without complications . . . . .	41	62	55	370	236	203
otitis media { with polypi . . . . .	24	22	13	216	18	20
{ with caries or necrosis, facial paralysis } . . . . .	12	4	8	12	—	14
Residua of purulent otitis media . . . . .	51	46	16	40	17	23
Catarrh of the Eust. tubes . . . . .	5	5	17	—	—	—
Otalgia . . . . .	14	8	3	16	—	4
OTHER DISEASES OF THE MIDDLE EAR.						
<i>Diseases of the nervous apparatus.</i>						
Ménière's disease . . . . .	1	2	—	3	—	—
Deafness after infectious diseases . . . . .	1	4	22	—	2	2
"    "    meningitis . . . . .	9	3	—	—	4	1
Deaf-mutism . . . . .	1	2	11	20	10	7
NASAL AND PHARYNGEAL DISEASES . . . . .						
Other diseases of the nervous apparatus . . . . .	13	40	—	128	5	2
No diagnosis . . . . .	10	—	11	—	—	—

Histories of cases are appended to Hessler's, Marian's, and Bürkner's reports, for which we must refer the reader to the originals. Hedinger appends contributions on the progress of otology in the last few years.

10. GOTTSTEIN emphasizes the importance of attending to the aural affections arising in the course of the acute infectious diseases in their incipency. In one of his patients, suffering from measles, microscopic examination detected a desquamative inflammation of the membrana tympani with perforative, purulent otitis media. In two other cases which he examined during their acute stages, diphtheritic otitis was superadded to measles and scarlatina. Gottstein thinks that Burkhardt-Merian goes too far if he believes that the Eustachian tube is the only way in which a diphtheritic otitis may develop in the course of an angina diphtheritica; it may also be the symptomatic evidence of a general infection. According to Gottstein's experience the aural troubles in scarlatina often only arise after the inflammatory condition of the throat has subsided and he, therefore, arrives at the conclusion that in infectious diseases the "specific causes" of disease are peculiarly disposed to involve the ear.

11. In the case of a young lady, hemorrhages of the right ear were noticed at every menstrual period; these were often quite severe and were attended with headaches. On examination ORNE GREEN found a small tumor, covered with a thin cuticle, in the meatus. The tumor, thought to be the cause of the hemorrhage, was excised and found to be an atheroma; after its removal the bleeding ceased. In another case in which Orne Green observed hemorrhages from the ear during menstruation, there was destruction of the membrane. A third case is reported in which a cyst was found in the meatus, which was only covered by a thin cuticle, occupying two thirds of the passage from the orifice almost to the membrane. Two cases of otorrhœa in phthisical patients, which were cured are also reported.

12. GRUBER discusses the views advanced in the debate following Löwenberg's address, "Deaf persons' gaping," delivered at Milan, and summarizes his views as follows: 1. There can be no doubt that certain ear patients, who are troubled with respiratory noises, owing to obstruction of the nasal passages, are enabled to hear better when their mouths are open. But the idea, that these noises are the sole cause of patients keeping their mouths open when listening, cannot be entertained. 2. The improvement of hearing observed when the mouth is open can be explained by the alteration of the configuration of the external ear canal and the deeper structures of the conductive apparatus, caused by the depression of the lower jaw. 3. In some of these patients it

is the resonance produced by the shape of the mouth, which either alone, or in conjunction with other changes in the conductive apparatus due to the depression of the lower jaw, improves hearing. 4. The facility of respiration, which is found by opening the mouth, may, in some cases, conduce to the increase of hearing power.

13. GRUBER concurs with Weil in attributing to reflex action the removal of tinnitus by inflation of the external meatus; the more so, as he has found, that this can also be effected by the application of cold to the walls of the meatus. He adds that the changes in atmospheric pressure in the external meatus cause alteration in the circulation and the tension of the conductive apparatus and the labyrinth. (The observation, that positive pressure in the ear canal may cause bulging and negative pressure depression of the drum-head, may be due to an ocular illusion caused by monocular vision.—Rev.) As the inflation of the middle ear and the rarefaction of air in the meatus have different effects, it is necessary, in the proper cases, also to investigate the effects of positive or negative pressure in the canal. As a rule, negative pressure acts more beneficially than positive, but both, combined, may do well.

14. The possibility that the air driven by the douche into the middle ear may carry numerous particles of dust and thereby cause irritation in the middle ear and prolong the duration of inflammatory processes, caused ZAUFGAL to attach a disinfecting apparatus to the air-bag. This consists of a spherical capsule, divided into two parts, between which the disinfecting substance is enclosed in a lattice-work of wire. Tubing can be attached to the two ends of the capsule. If it is desirable to attach this to the hand-bag it can be done, and by adding a stop-valve it can be attached to the catheter. The capsule is filled either with Lister's gauze or Bruns' cotton. The gauze is intended to intercept loose fibres of cotton. Chloroform, ether, turpentine, etc., can also be used by means of the bulb.

15. CRESSWELL BABER reports that when a tuning-fork, placed on the median line of the skull, is heard loudly in the obstructed ear, perception will be less and less the more the finger is pressed into the ear. This may be due: 1, to the depression of the chain of bones and the slight increase of the intralabyrinthine pressure; 2, to the impediment of the vibrations of the ossicula in consequence of the altered tension. This is the explanation of

the fact that in some diseases of the middle ear the tuning-fork is heard less distinctly in the diseased ear than in the healthy one.

16. POLITZER observed that the reflection of sound from the concha into the meatus is assisted by the tragus, lying opposite, and the intensity of the sound is considerably increased, when the surface of the tragus is increased, by attaching a small firm plate behind it. To effect this, Politzer devised a little instrument in the shape of a horn, curved at right angles, the smaller end of which is inserted into the meatus, while the larger end rests upon the auricle. It is made of vulcanized rubber. If the sound-waves are directed toward the face, the instrument will increase their intensity. In many cases the improvement of hearing amounts to a hundred per cent. and over.

17. In order to make the otoscopic image visible to a second observer, GRÜNFELD suggests the use of a round or oval plane mirror of  $\frac{1}{2}$ -2 cm. diameter, which is attached to a fork by means of a hinge joint. This fork can be fastened to any aural speculum and may be just as readily detached. The angle between the mirror and the axis of the speculum is generally somewhat more than  $45^\circ$ . The first observer looks from the mirror directly on to the drum-head, which is illuminated by the reflector, whereas the second can see the reflected image in the mirror.

18. In POMEROY's reflector the ball of the joint is attached to a perpendicular rod fastened to the back of the mirror, and then bent at a right angle. The ball is attached to the forehead band by two clamps, which are tightened by means of a screw. By adjusting their relative dimensions free motion is secured. (The up-and-down movement is deficient. This can be secured by means of a double ball-and-socket joint, such as is depicted in the Reviewer's "Diseases of the Ear.")

19. In his report on the Second International Congress of Deaf-Mute Teachers, which was almost altogether attended by Frenchmen and Italians, TREIBEL speaks in highest praise of the discipline of the scholars of the schools for deaf-mutes in Milan. He also reports the proceedings of the Congress, at which, as is well known, articulate language gained a victory over sign-language, as is proven by the following resolutions, which were passed: "Being convinced of the superior merits of articulate language over sign-language, because, 1, the former enables the deaf-mutes to have

intercourse with the outer world, and, 2, enables them to appreciate the true spirit of language, this Congress declares that the use of articulate language is to be preferred in the instruction and education of deaf-mutes." The simultaneous use of the two methods was not advised.

EXTERNAL EAR.

20. HUTCHINSON. Noma of the ear. *Med. Times and Gazette*, Jan. 2, 1881.

21. WEIL, Stuttgart. Circumscribed desquamative inflammation of the external meatus. *Monatsschr. f. Ohrenheilk.*, No. 3, 1881.

22. SAMUEL THEOBALD, Baltimore. Four cases of otomycosis aspergillina successfully treated by means of the oxide of zinc and boracic acid. *Amer. Journ. of Otol.*, vol. iii, page 119.

23. CATRIN, Condé. The removal of foreign bodies from the external canal. *Gaz. Hebdom.*, No. 2, 1881.

24. BARR. Pea in the ear, etc. *Glasgow Med. Journ.*, vol. xv, No. 5.

25. FRANCIS BROWN, Boston. Impacted foreign bodies, etc. *Amer. Journ. of Otol.*, vol. iii, page 29.

26. JOY, New York. Two difficult cases of foreign bodies in the ear. *Ibid.*, page 144.

27. FIELD, London. Ivory exostosis in both ears successfully removed by operation. *Lancet*, Jan. 8 and 15, 1881.

28. J. GRUBER, Vienna. Contribution to the knowledge of the new formation of cartilage and bone in the ear. *Wien. Med. Presse*, Nos. 7, 8, and 9, 1881.

29. R. TORRANCE. Rupture of the membrana tympani, with diffuse myringitis, owing to a blow with a snowball. *Brit. Med. Journ.*, Feb. 5, 1881.

30. E. GAMPIETRO, Naples. A new artificial drum-membrane and its application in practice. *Monatsschr. f. Ohrenh.*, No. 1, 1881.

31. G. CZARDA, Prague. On antiseptics in aural surgery. *Wien. Med. Presse*, Nos. 20 and 21, 1881.

32. MCKEOWN. A new method of treating flaccidity of the drum-head. *Dublin Journ. of Med. Science*, Jan., 1881.

33. J. GRUBER, Vienna. Incision of the posterior fold of the drum-head. *Wiener Allgem. Med. Zeitschr.*, Nos. 1 and 2, 1881.

20. An acute inflammation occurred in a poorly nourished child, aged 4 years, having chronic otorrhœa, which became phagedænic. In the auricle a perforation was found having a diameter of several *mm.* The edges as well as the surrounding tissues were covered by a dirty brownish deposit. This being removed, under anæsthesia, and the parts well cauterized with acid nitrate of mercury, recovery soon took place. The upper and lower portions of the auricle were united by means of a narrow strip of the helix.

21. WEIL reports a case of desquamative inflammation of the external meatus. It took three weeks before the accumulated mass was removed. The inner end of the canal was dilated.

22. THEOBALD does not think that the use of alcohol for the removal of aspergillus is sufficiently sure, and has had good results from the use of a mixture of oxide of zinc and boracic acid.

23. CATRIN reviews the different methods of removing foreign bodies from the ear, and favors forcible injections. Eight cases are reported in detail in which foreign bodies were removed by means of the syringe.

24. A pea lay two years in the meatus without causing any inflammation. Removed by means of syringe and spatula.

25. BROWN speaks of vegetable foreign bodies which germinate when in the ear. They should not be allowed to remain, but should be removed without delay. The longer they remain, the more difficult will be their removal. Brown's deductions are principally based on those made by others.

26. In two cases JOY was only able to remove foreign bodies by narcotizing the patients and applying a polypus forceps recommended by Sexton.

27. FIELD adds another to his case of ivory exostosis removed by means of the dental drill, which was reported two years ago. This was in a man aged 31, in whom the exostoses, as in the former case, were found on both sides, occluding the canals and rising on both sides from the posterior wall. The operation, for which Field deems three assistants necessary, was first done on the right side, and it took 50 minutes before the drill was able to perforate the tumor. The orifice was dilated two weeks later. The operation on the left side took 55 minutes, and two after-operations were necessary. The walls of the meatus were protected by means of a narrow spatula. At first a fine, and later a



coarse drill was used. It is often necessary to operate in the dark, as the whole canal is filled with blood. It is not necessary to incise the skin before applying the drill. The operation is tedious and difficult, and many complications may arise in spite of every precaution. In the last operation the drill slipped, and, perforating the drum-head, entered the Fallopian canal, causing facial paralysis. This soon disappeared and hearing was restored on both sides.

28. GRUBER agrees with Delstanche and Hedinger that the so-called exostoses are ostoid formations which owe their origin to a hyperplasia caused by a pre-existing inflammation. To these—the rarest form of neoplasm—those produced by newly-formed cartilage may be added. A case is reported in which a hard tumor was found situated about  $\frac{1}{2}$  cm. from the external orifice and completely filling the canal. This was readily removed by means of the chisel—the base was broken off with a forceps. On microscopic examination it was found that the growth was an enchondroma.

29. A rupture of the membrana tympani was caused by the throwing of a snowball; it was parallel to the handle of the malleus and behind it. A few days after the injury a sensation of cold on the same side of the tongue, and an impairment of the sense of taste were noticed. This TORRANCE attributed to an injury of the chorda tympani.

30. In an introduction to the description of a new artificial drum-head, GAMPIETRO gives a description of those used heretofore. He has a particularly poor opinion of Yearsley's cotton pellets and of Miot's artificial drum-head. He thinks (very improperly, Rev.) that the former conduces to the development of new inflammations, and instead of improving audition is apt to make it worse. Gampietro's new instrument consists of a rubber disk, on the lower third of which a perpendicular projection is attached. A gold wire is wound spirally around this, the two ends of which go asunder. These two spring-like ends are pressed together with a forceps and the membrane is introduced into the meatus. It is maintained in its position by the gold wire.

31. In view of the favorable results obtained by the application of antiseptics to otorrhœa, CZARDA thinks that in the introduction of artificial membranes antisepsis must also be of service. He therefore uses Lister's silk protective, which, as he thinks,

possesses antiseptic properties. The silk tympanum can be made more firm by adding small pieces of mackintosh or vegetable parchment. The membrane is introduced by means of a canula or wire.

32. McKEOWN reports 13 cases of relaxation of the drum-head, which were benefited by the application of collodion. He lauds the advantages of this method, by means of which, in the majority of cases, an immediate improvement of hearing and a diminution of all unpleasant symptoms, such as noises, etc., are achieved. The variations in the acuity of hearing are lessened. Collodion can also effect a permanent increase of the tension of the membrane.

33. In those cases in which the layers of the folds of the drum head, passing in curved lines over the posterior quadrant, adhere to one another, or where foreign bodies are deposited between them, GRUBER does not consider paracentesis in a vertical direction, as is generally done, satisfactory. He performs the operation along the transverse axis of the fold. No results are given.

#### MIDDLE EAR.

34. CHAS. BURNETT, Philadelphia. Perforations of the membrana flaccida, etc. *Amer. Journ. of Otol.*, vol. iii, p. 12.

35. EDWARD ELY, New York. Transplantation of skin in chronic purulent otitis media. These ARCHIVES, vol. ix, p. 343.

36. P. MCBRIDE. Observations of ear disease. *Edin. Med. Journ.*, April, 1881.

37. ENG. MORPURGO, Trieste. On the use of alcohol in the treatment of granulations and polypi of the middle ear. *Lo Sperimentale*, February 2, 1881.

38. ARIZA, Madrid. Aural polypi. Clinical lecture, 1881.

39. F. TRAUTMANN. Fibrous polypi of the mastoid process, which extended through the external auditory meatus. *Arch. f. Ohrenheilk.*, vol. xvii, p. 177.

40. VOLTOLINI, Breslau. Aural polypi and their treatment. *Monatsschr. f. Ohrenheilk.*, No. 2, 1881.

41. H. SCHWARTZE, Halle. Second series of fifty cases of surgical perforation of the mastoid process (continued). *Arch. f. Ohrenheilk.*, vol. xvii, p. 92.

42. SNELL, Sheffield. A case in which the mastoid process was opened, etc. *Lancet*, March 12, 1881.

43. A. BING, Vienna. The diseases of the mastoid process; their relations to the ear. *Thesis. Wien. Med. Blätter*, Nos. 14, 15, and 16, 1881.

44. BARR. Mastoid periostitis, etc. *Glasgow Med. Journ.*, vol. xv, No. 5.

45. WEIL, Stuttgart. Otorrhœa and its treatment. *Memorabilien*, part ii, 1881.

46. WEIL, Stuttgart. Contribution to the ætiology of retro-pharyngeal abscesses. *Monatsschr. f. Ohrenheilk.*, No. 3, 1881.

47. JAMES POLLAK. Gumma of the mastoid process and temporal region complicated with otitis media purulenta. Cure. *Allgem. Wien. Med. Zeitschr.*, No. 20, 1881.

48. CHAS. TODD, St. Louis. Distressing noise in the ear, probably due to spasm of the tensor palati. *Amer. Journ. of Otol.*, vol. iii, p. 140.

49. RUMBOLD, St. Louis. The Eustachian tube. *St. Louis Med. and Surg. Journ.*, 1881.

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34. BURNETT divides perforation of the membrana flaccida into three classes: First, those in the centre of the membrane, where the neck of the malleus is exposed; these are generally complicated with diseases of the external meatus, are quite amenable to treatment, and the discharge is not very profuse. Secondly, anterior perforations which lead directly into the anterior upper part of the tympanum, near the tympanic orifice of the Eustachian tube. These are met with in affections of the nose and the Eustachian tube; the secretion is profuse. They are the most amenable to treatment, and the deafness is generally relieved. Thirdly, posterior perforations, attended with profuse secretion; here we frequently have symptoms implicating the mastoid process, and find that this form is very intractable and generally attended with intense progressive deafness. Burnett has seen ten cases of perforation of the membrana flaccida, two anterior, three posterior, three central, two involving the entire membrane. The tympanic syringe is of the greatest service in the treatment of these cases.

36. Although, a year ago, Politzer announced his discovery of the fact that alcohol is of great service in the treatment of aural polypi, McBRIDE states that he had had considerable experience of the beneficial effects of this agent without knowing anything of Politzer's announcement. He advises the instillation of

alcohol two to three times daily—at first using dilute, afterwards pure. He also refers to the aberration of taste in aural affections, and reports a case in which a patient who, while having an aural polypus removed by means of a snare, had a sensation as if a wire were drawn around the tongue. There was no taste on that side; on the other, where there were also polypi, it was impaired. He also reports a case of malformation of the ear, which is illustrated by two wood-cuts.

37. MORPURGO reports his excellent results by using alcohol for the cure of three cases of aural polypi. He states that this remedy often requires some time before achieving the desired results—in one of his cases as long as three months. The use of alcohol is indicated when a specialist cannot be consulted, when there is no danger of any fatal complications arising, and when the patient refuses to submit to an operation.

38. ARIZA treats of aural polypi and speaks *in extenso* of their ætiology, nature, and histology. In cases in which the snare fails to eradicate them, Ariza recommends the use of one of Pomeroy's forceps.

39. In one of TRAUTMANN's patients three polypi were found in the external meatus. They arose from above and behind. On the upper-posterior wall of the meatus a circular opening was discovered, which led into a cavity about the size of a hazel-nut, containing a fourth polypus and friable masses, which, on examination, proved to be the remains of fibrous polypi which originated in the mastoid cells.

40. VOLTOLINI remarks that if on probing polypi or polypoid excrescences great pain is felt, the prognosis is bad, and we may be sure that some serious trouble, such as carious bone, is at bottom. Two illustrative cases are reported. In operating Voltolini uses the galvano-caustic snare, and tears the growth away without heating the wire; or if there be resistance, heats it to the requisite degree. He also uses the galvano-cautery for the after-treatment, by means of a very fine cautery. This operation is comparatively painless.

41. SCHWARTZE reports 13 new cases of operations on the mastoid process. In 7 cases, only a dilatation of fistulous tracts was required. One of these cases (No. 70) terminated fatally, owing to diffuse meningitis, due to necrosis of the labyrinth. In case No. 59 there was a syphilitic periostitis as well as profuse otorrhœa. The bone was chiselled away to a depth of 2 cm. without find-

ing any pus. In spite of this, immediate subsidence of discharge and ultimate cure. Schwartze remarks the painless course of the disease. In Case 63, after the trepanation, there was a sudden escape of a large quantity of fluid, ichorous pus. Subdural abscess (?) on the carious pyramid. Death ensued eleven days after the operation, owing to meningitis.

42. SNELL reports the case of a patient who, besides having an otorrhœa, suffered great pain, which made sleep impossible. On examination he found swelling of the mastoid and neighborhood. While operating, pus was found under the periosteum. He enlarged an existing perforation in the bone, which was followed by a profuse evacuation of pus.

43. BING gives us a résumé of the diseases of the mastoid process based on the writings of Politzer, Gruber, v. Tröltsch, Schwartze, etc.

44. BARR reports a case of acute periostitis of the mastoid which was cured by Wilde's incision.

45. To illustrate the dangers following purulent discharges of the tympanum, WEIL reports two cases on which he made *post-mortem* examinations. In the first an incision was made over the mastoid process, which was followed by a profuse evacuation of ichorous pus; then trepanation of the bone. Death ensued in consequence of the rupture of a cerebellar abscess a few days after.

In the second case death was due to meningitis. He also recommends the use of boracic acid in otitis media.

46. WEIL incised a retro-pharyngeal abscess, which arose during the existence of an otorrhœa, three times. Death ensued owing to an œdema of the glottis. Weil regards the otitis media purulenta as the primary affection, which was followed by purulent destruction of the pharyngeal glands by absorption into the lymphatics. He quotes Kormann, who also says that these abscesses are often caused by otitis med.

47. POLLAK describes a case in which, besides an otitis media and consecutive otitis externa diffusa, a periostitis of the mastoid set in, owing to a partial breaking down and evacuation of pus of gummous tumors.

48. One of TODD's patients had long suffered from a feeling of pressure and weight in the head and an intense rustling noise in the ear. This latter was distinguishable more than six inches from the ear, and much better by means of a stethoscope placed

upon the mastoid, also near the nostrils and the open mouth. It could be produced at will by contracting the muscles of the neck. When the noise is heard, synchronous contraction of the tensor palati takes place. Paracentesis of the drum-head failed to afford relief; faradization of the tubal muscles was only of temporary benefit.

49. RUMBOLD, after having examined patients with abnormally patent Eustachian tubes, arrives at the following conclusions :

1. During deglutition there is no free entrance of air into the middle ear.
2. The walls of the tubes are always in slight contact.
3. Air constantly passes into the tympanum.
4. In the healthy ear the air contained in the drum cavity is of lesser density than the surrounding atmosphere.
5. One of the functions of the tube consists in maintaining this difference of density.
6. Rarefaction of air in the tympanum is the cause of concavity of the drum-head.
7. A certain degree of uniform pressure upon the intralabyrinthine fluid is necessary for normal hearing.

In two patients having abnormally patent tubes, as soon as these were opened a sensation of fulness, impairment of hearing, and diminution of the concavity of the drum-head were noticed. As soon as the tubes were closed all these symptoms disappeared.



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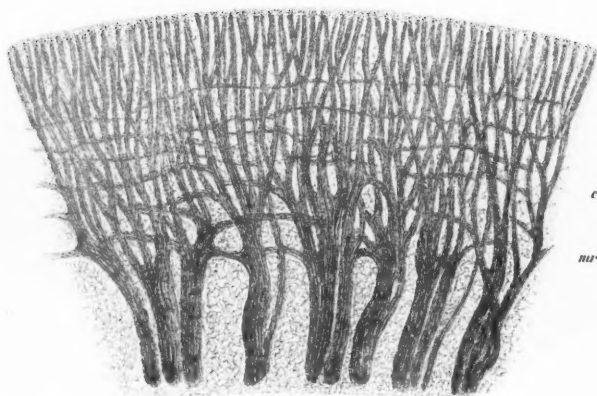


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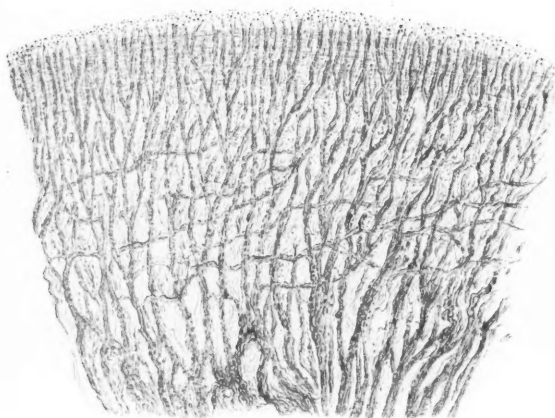


Fig. 5

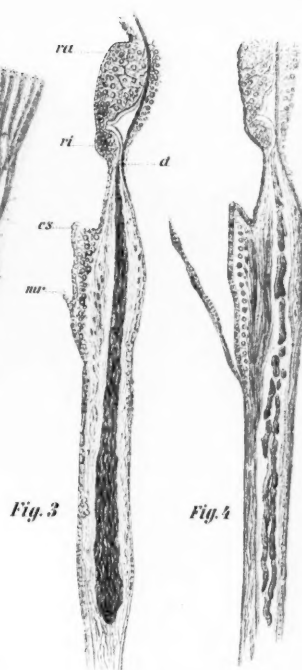
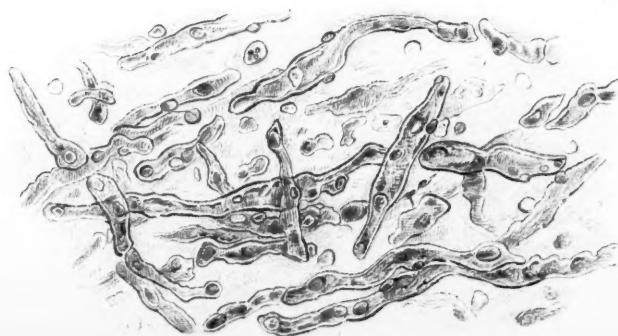
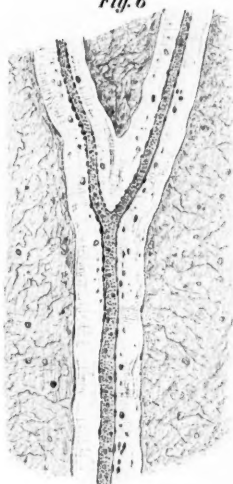


Fig. 3

Fig. 4

Fig. 6



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Fig. 1

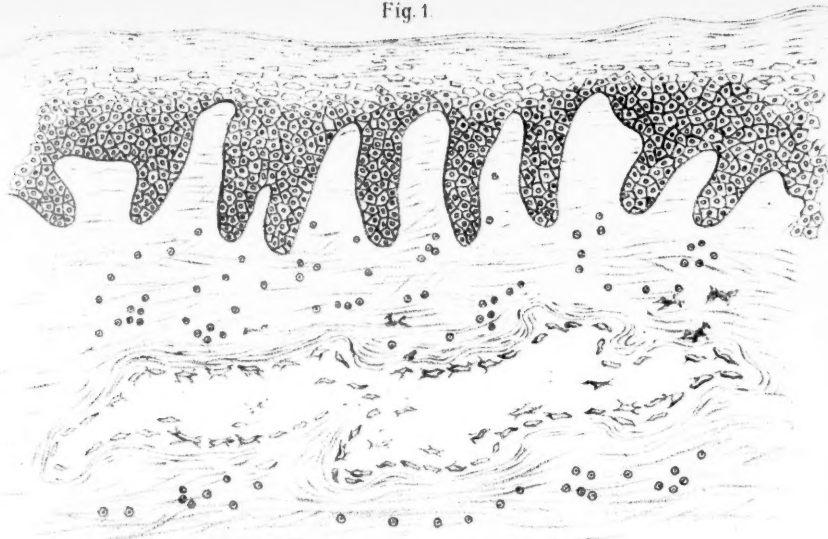


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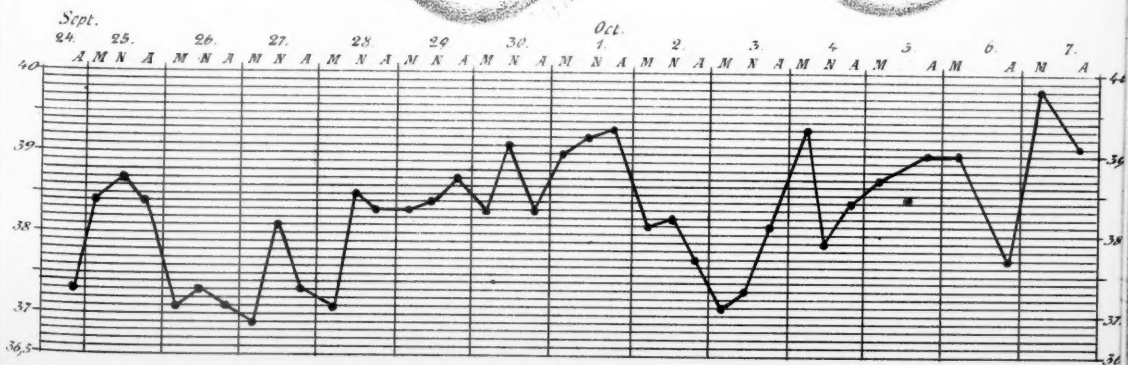
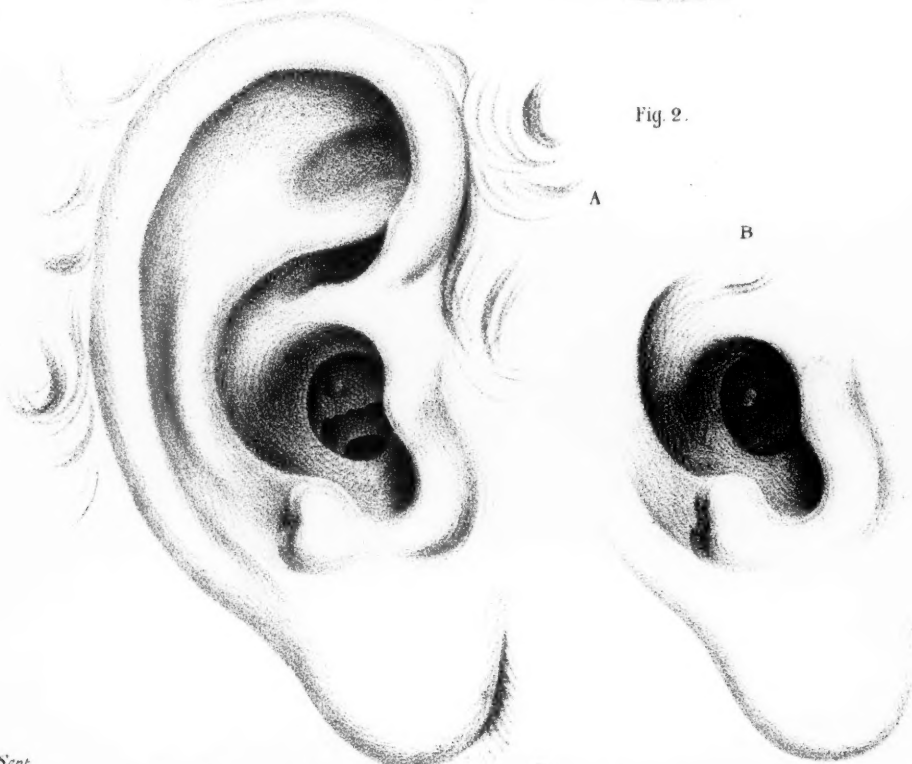




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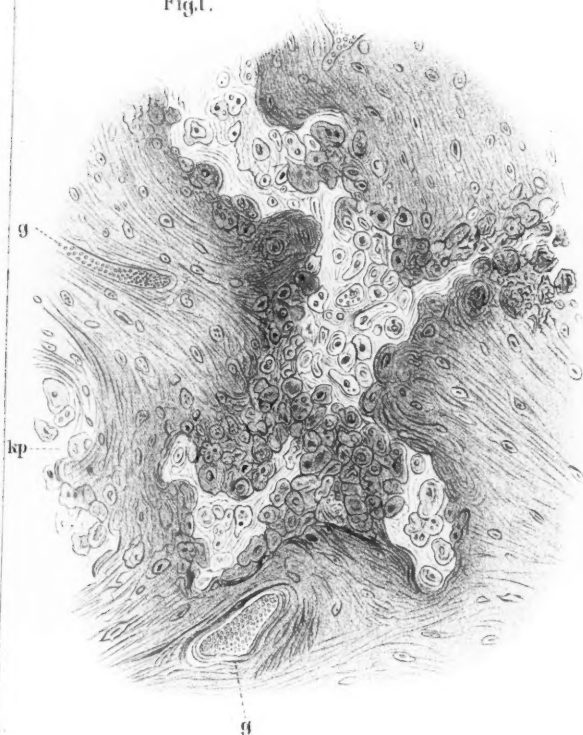


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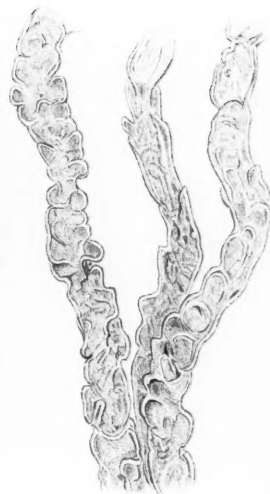


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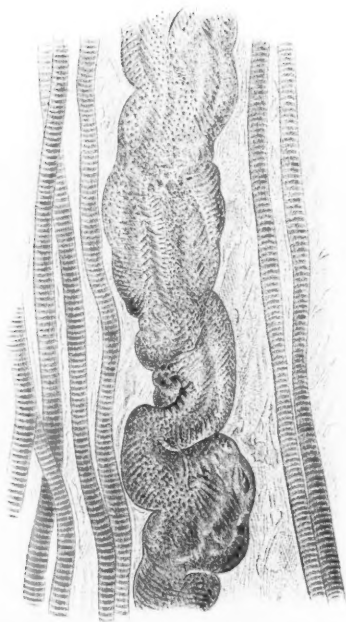
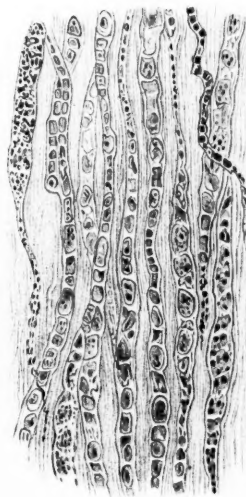


Fig. 4.







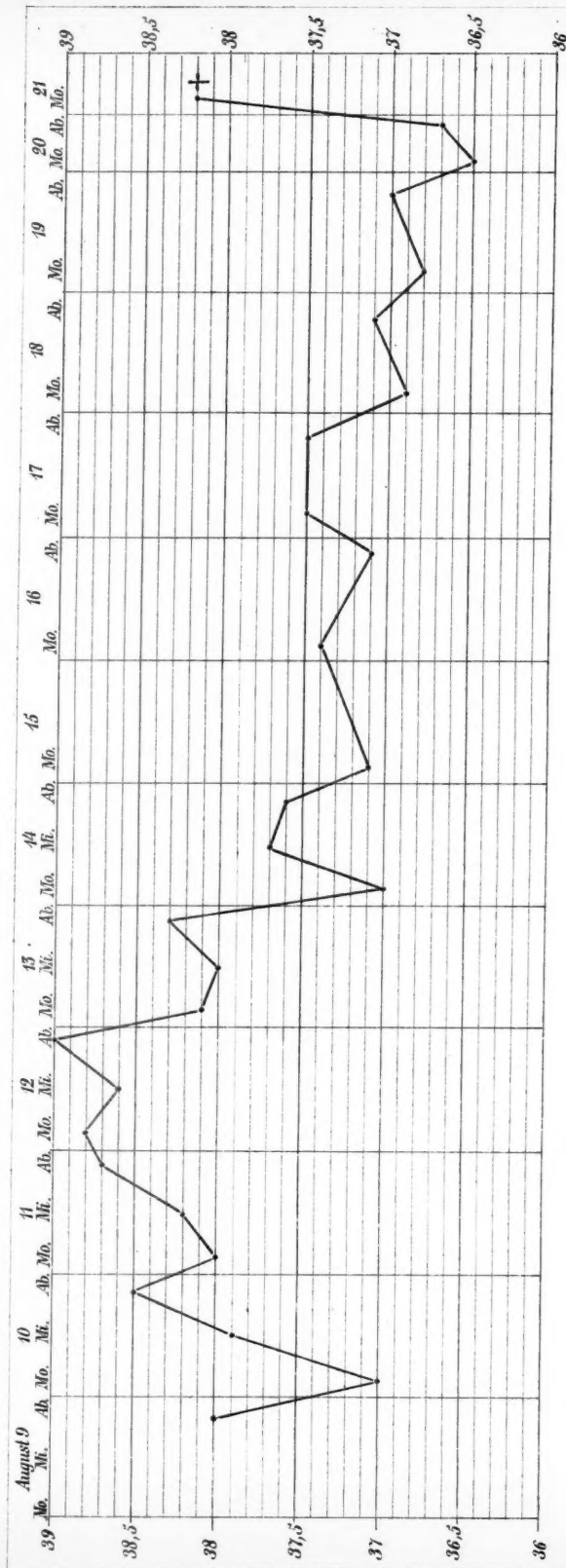
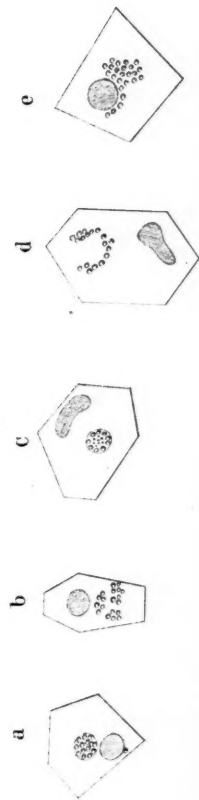


Fig. 5.



Dr. Ant. F. A. Panko, Leipzig.



